AD-A155 455 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS VAN 1/1
HORN PARK UPPER D..(U) CORPS OF ENGINEERS WALTHAM MA
NEW ENGLAND DIV JUL 78

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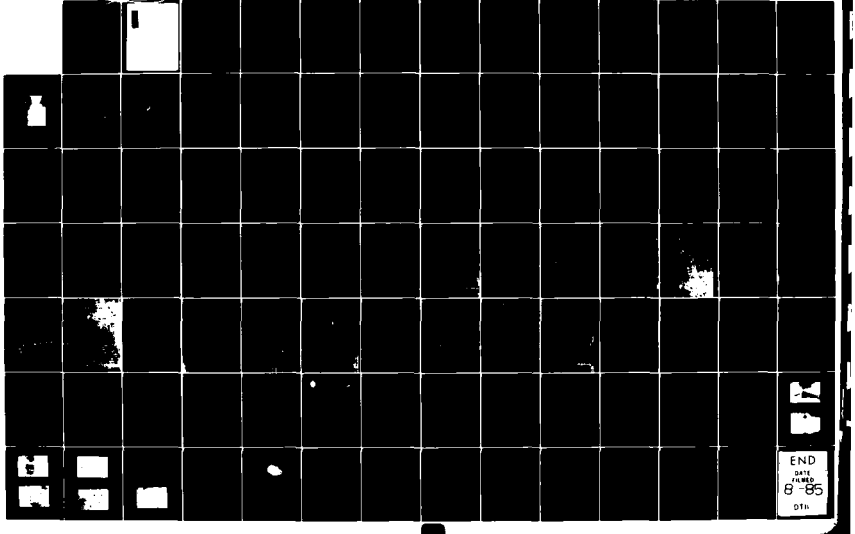

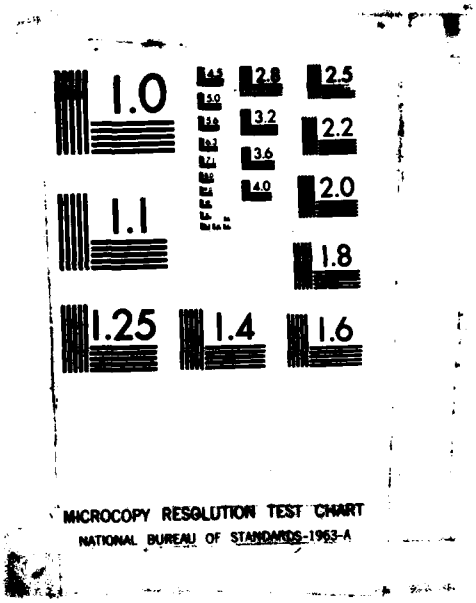
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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Connecticut River Basin
Springfield, Massachusetts

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Some existing deficiencies regarding maintenance operation of the project features were observed. A Design Flood was developed that was equivilant to one half the Probable Maximum Flood. No remedial measures are required by the owner at the present time.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF
NEDED

OCT 10 1978

Honorable Michael S. Dukakis
Governor of the Commonwealth of
Massachusetts
State House
Boston, Massachusetts 02133

Dear Governor Dukakis:

I am forwarding to you a copy of the Van Horn Park Upper Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts. In addition, a copy of the report has also been furnished the owner, The City of Springfield, c/o Superintendent of Parks and Maintenance, 15 Fayette Street, Springfield, Massachusetts 01118.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Quality Engineering for your cooperation in carrying out this program.

Sincerely yours,

JOHN P. CHANDLER
Colonel, Corps of Engineers
Division Engineer

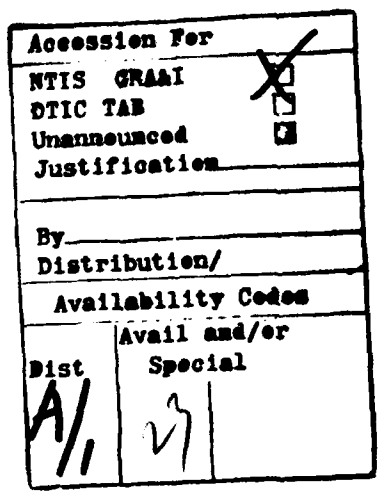
Incl
As stated

VAN HORN PARK UPPER DAM
MA 00574

CONNECTICUT RIVER BASIN
SPRINGFIELD, MASSACHUSETTS

PHASE 1 INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM



PHASE I REPORT

NATIONAL DAM INSPECTION PROGRAM

Inventory No.:	MA 00574
Name of Dam:	VAN HORN PARK UPPER DAM
Town Located:	SPRINGFIELD
County Located:	HAMPDEN
State Located:	COMMONWEALTH OF MASSACHUSETTS
Stream:	NOT APPLICABLE
Date of Inspection:	1 JUNE 1978

ASSESSMENT

Examination of available documents and visual inspection of the Van Horn Park Upper Dam and appurtenant structures did not reveal any conditions which would render the project inadequate. Some existing deficiencies regarding maintenance and operation of the project features were observed.

Because there are no data on Probable Maximum Floods or Standard Project Floods for drainage areas of comparable size and condition, a design flood hydrograph was synthesized for the contributing area. A Design Flood was developed that was equivalent to one half the Probable Maximum Flood. The resulting inflow hydrograph has a one hour duration peak discharge of 1180 cfs and a runoff volume equivalent to 11.5 inches in 9 hours. Routing this flood through the reservoir, using computerized techniques, resulted in a maximum discharge of 755 cfs with the pool rising to within 0.2 feet of overtopping the dam (El. 175).

Since the dam is not expected to be overtopped with an inflow equal to the runoff from one half the Probable Maximum Flood, it is considered that the dam design is adequate from a hydrologic and hydraulic standpoint.

No remedial measures are required by the owner at the present time. However, certain measures are recommended for short term implementation, and others, as part of a normal maintenance program. These measures are as follows:

- Programs for observing and monitoring seepage and structural movements.

- Repair and maintenance of dam and appurtenant structures.

- Programs for operation, maintenance and inspection.

Eugene O'Brien, P.E.
New York No. 29823

This Phase I Inspection Report on Van Horn Park Upper Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

Charles G. Tiersch

CHARLES G. TIERSCH, Chairman
Chief, Foundation and Materials Branch
Engineering Division

Fred J. Ravens Jr.

FRED J. RAVENS, Jr., Member
Chief, Design Branch
Engineering Division

SAUL COOPER, Member
Chief, Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar

JOE B. FRYAR
Chief, Engineering Division

JUL 14 1978

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

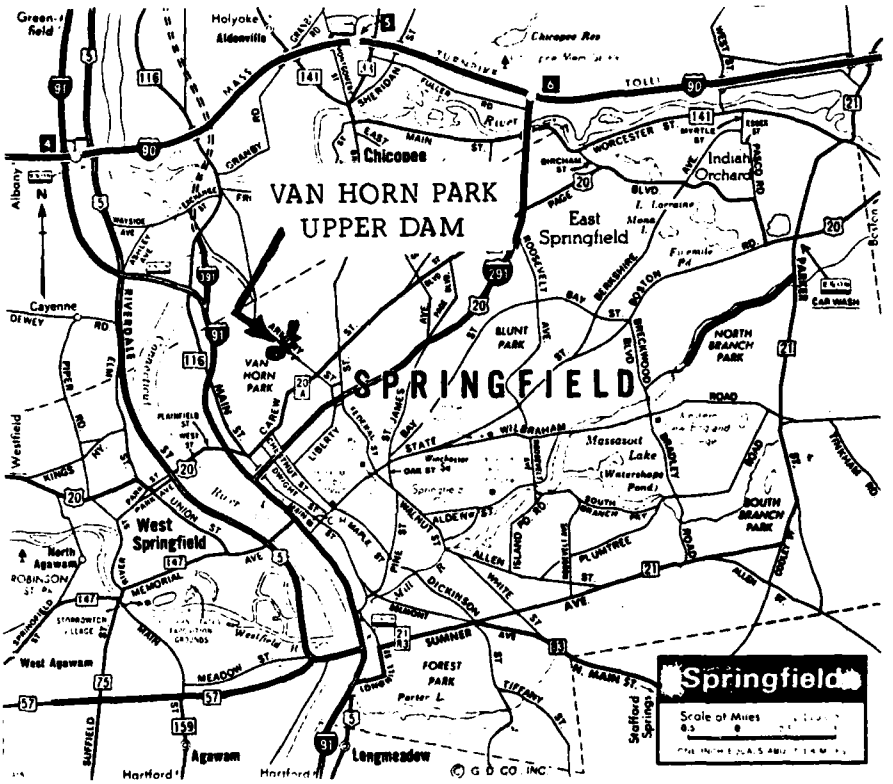
In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

CONNECTICUT RIVER BASIN
INVENTORY NO. MA 00574
VAN HORN PARK UPPER DAM
PHASE I INSPECTION REPORT

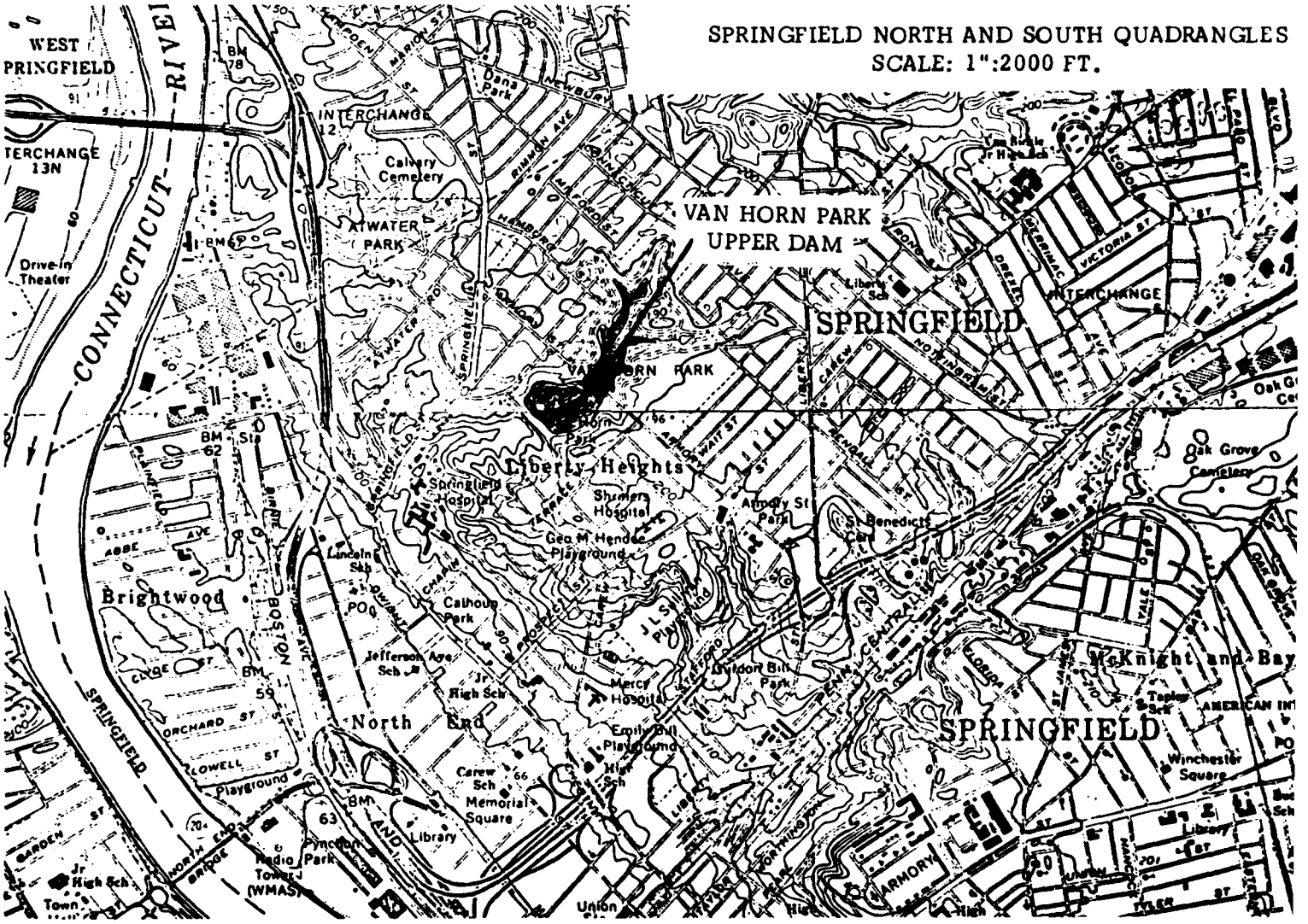
CONTENTS

(1) GENERAL OVERVIEW OF UPSTREAM SLOPE OF DAM AND POND



VICINITY MAP
VAN HORN PARK UPPER DAM

SPRINGFIELD NORTH AND SOUTH QUADRANGLES
SCALE: 1":2000 FT.



TOPOGRAPHIC MAP
VAN HORN PARK UPPER DAM

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
CONNECTICUT RIVER BASIN
INVENTORY NO. MA 00574
VAN HORN PARK UPPER DAM
CITY OF SPRINGFIELD
HAMPDEN COUNTY, COMMONWEALTH OF MASSACHUSETTS

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Tippetts-Abbett-McCarthy-Stratton has been retained by the New England Division to inspect and report on selected dams in the State of Massachusetts. Authorization and notice to proceed was issued to Tippetts-Abbett-McCarthy-Stratton under a letter of May 3, 1978, from Mr. Ralph T. Garver, Colonel, Corps of Engineers. Contract No. DACW 33-78-C-0298 has been assigned by the Corps of Engineers for this work.

b. Purpose

(1) Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) Encourage and prepare the States to initiate quickly effective dam safety programs for non-Federal dams.

(3) To update, verify and complete the National Inventory of Dams.

1.2 DESCRIPTION OF THE PROJECT

a. Description of Dam

The Van Horn Park Upper Dam is an earth dam about 550 feet long with a maximum height of 32 feet and crest width of 50 feet. The upstream and downstream slopes of the embankment as observed are approximately 1(V): 1.5(H) and 1(V): 2(H), respectively. Both slopes are covered with a heavy

growth of trees, bushes, shrubs and ground cover. The crest of the dam serves as a roadway and sidewalk for Armory Street.

Located approximately at the center of the dam is an uncontrolled outlet for the pond consisting of a reinforced concrete double box culvert and spillway chute. The twin barrels are 8 ft. wide, 5 ft. high, 60 ft. long, and are on a slope of 0.5 percent. The invert or sill of the box culvert is at El. 168.5. The approach to the culvert is riprapped for a distance of 10 feet. Discharges through the culvert are carried to the Van Horn Park Lower Pond by a reinforced concrete spillway chute which is 17 feet wide at its upstream end and narrows to 10 feet at approximately mid-length. The walls of the chute are 6 to 10 feet high. The chute floor slopes from El. 167.5 to El. 143.52. Adjacent to the spillway chute on three sides is a 10 feet wide zone of riprap protection consisting of 36 inch stone.

There is also an uncontrolled low level outlet located at the north abutment. This outlet consists of a series of 12 inch, 15 inch and 18 inch diameter vitrified clay pipes having a total length of about 1090 feet. The pipe runs parallel with the north shore of the Van Horn Lower Pond, outfalls into a brook which flows approximately parallel to and at the downstream toe of the Van Horn Lower Dam.

b. Location

The dam is located in the northern section of the City of Springfield approximately 1 mile east of the Connecticut River. Apparently there are no streams of any significant size supplying water to the pond.

c. Ownership

The Van Horn Park Upper Dam is owned by the City of Springfield. The day-to-day operation and maintenance is managed by the Park Department, Forest Park Office, City of Springfield.

d. Purpose of Dam

The impoundment provided by the dam is for recreational purposes.

e. Design and Construction History

Original design and construction records are not available. In 1957, modifications to the dam were made to include the existing box culvert and chute. The design modifications were carried out by Green Engineering Affiliates, Inc., Boston, Mass. The construction records for this modification are not available.

f. Normal Operating Procedures

There are no normal operating procedures since all flows from the pond are uncontrolled. The outflow eventually enters the City of Springfield's storm sewer system and then into the Connecticut River.

g. Size Classification

The dam is less than 40 feet high and has a storage capacity of less than 1000 acre-feet, therefore it is classified as a "small" dam.

h. Hazard Classification

The dam is in a "low" hazard potential category due to the fact that should the dam fail, the flood wave would be absorbed by the Van Horn Park Lower Pond. The only loss would be the destruction of a section of Armory Street.

i. Operator

The person responsible for the day-to-day operation of the dam is:

Mr. Albert Poehler
Superintendent of Parks and Maintenance
15 Fayette Street
Springfield, Mass., 01118
Telephone No. (Home) 413-778-4605
(Office) 413-732-2181

1.3 PERTINENT DATA

a. Drainage Areas

The Van Horn Park Upper Dam controls the drainage from a depressed basin within the City of Springfield, Mass., with no defined drainage channels. The total contributing area is given as 0.41 square mile (262 acres). Of the total area about 62 acres is undeveloped park and 200 acres is developed urban area.

The urban area surrounding the park is served by storm sewers which carry the runoff from frequent storms away from the topographic basin. In a major storm, the runoff would exceed the design capacity of the sewers, and excess runoff would flow overland to the pond.

b. Discharge at Damsite

The spillway for the Van Horn Park Upper Dam is a double box culvert, each barrel is 8 ft wide and 5 ft high, 60 ft long, and is on a slope of 0.5 percent. The culvert is located on the top of the dam. El. 175,with an invert or sill at El. 168.5, 6.5 feet below the crest of the dam. The design capacity given on construction drawings is 730 cfs, which is estimated to be the capacity with the water surface at El. 174.7 or 0.3 feet below the crest of the dam. The design capacity is equal to 1780 cfs per square mile (2.79 cfs per acre).

There is no record of the maximum flood at the damsite.

c. Elevation (ft. above MSL, Springfield Datum)

Top dam	175.0
Maximum pool-design surcharge	Unknown
Full flood control pool	Not Applicable
Recreation pool	168.5
Spillway crest (gated)	Not Applicable
Upstream portal invert diversion tunnel	Not Applicable
Downstream portal invert diversion tunnel	Not Applicable
Streambed at centerline of dam	Not Applicable
Maximum tailwater	Unknown

d. Reservoir

Length of maximum pool	1600± feet
Length of recreation pool	1500± feet
Length of flood control pool	Not Applicable

e. Storage (acre-feet)

Recreation pool	Unavailable
Flood control pool	Not Applicable
Design surcharge	Unknown
Top of dam	96

f. Reservoir Surface (acres)

Top dam	19
Maximum pool	19
Flood-control pool	Not Applicable
Recreation pool	9.6
Spillway crest	9.6

g. Dam

Type	Earth
Length	550 feet (approx.)
Height	32 feet
Top width	57 feet
Side Slopes - U/S	1(V):1.5(H)
D/S	1(V):2(H)
Zoning	Unknown
Impervious core	Unknown
Cutoff	Unknown
Grout curtain	Unknown
Other	None

h. Diversion and Regulating Tunnel

Type	Not Applicable
Length	Not Applicable
Closure	Not Applicable
Access	Not Applicable
Regulating facilities	Not Applicable

i. Spillway

Type	Reinforced Concrete Chute
Length of weir	17 feet
Crest elevation	167.5 feet
Gates	None
U/S channel	None
D/S channel	Short natural channel, then into Van Horn Park Lower Pond
General	None

j. Regulating Outlets

The regulating outlet consist of an uncontrolled reinforced double

concrete box culvert and spillway chute. The twin barrels are 8 feet wide, 5 ft high and 60 ft long, and are on a slope of 0.5 percent. The invert of the box culvert is El 168.5. The approach to the culvert is riprapped for a distance of 10 feet. Discharges through the culvert are carried to the Van Horn Park Lower Pond by a reinforced concrete spillway chute which is 17 ft wide at its upstream end and narrows to 10 feet at approximately mid-length. The walls of the chute are 6 to 10 feet high. The chute floor slopes from El 167.5 to El 142.5.

There is also an uncontrolled low level outlet located at the north abutment. This outlet consists of a series of 12, 15 and 18 inch diameter vitrified clay having a total length of approximately 1090 feet.

SECTION 2: ENGINEERING DATA

2.1 DESIGN

Design data, drawings or specific memoranda are not available for the original construction of the dam. However, there are contract drawings available for the alterations which were designed in 1957 by Green Engineering Affiliates Inc., Boston. (See Appendix)

These drawings are entitled:

a. Proposed Outlet Works, Plan and Details
b. Proposed Outlet Works, Borings & Miscellaneous Details
c. Proposed Outlet Works, Upper Pond Outlet

There is minimal information on subsurface conditions obtained from 1 boring drilled for the modification study. The boring log is shown on the drawing given in (b) above. The boring information has been used to develop a soils profile which is shown in the Appendix. There are no test results available from this subsurface exploration program.

2.2 CONSTRUCTION RECORDS

There are no detailed construction records available.

2.3 OPERATION RECORDS

No operation records are available and there is no daily record kept of pool elevation or rainfall at the dam site.

2.4 EVALUATION OF DATA

Existing information was made available by Department of Streets and Engineering, Springfield, Mass.; Office of the County Commissioners, County of Hampden; and Department of Environmental Quality Engineering, Division of Waterways, Boston, Mass. The drawings available contain information which indicates conditions in 1957 when modifications were designed. They do not indicate "as built conditions". However, the data reviewed are considered adequate for this Phase I inspection and evaluation.

SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General

A visual inspection of the Van Horn Park Upper Dam was made on June 1, 1978. The weather was sunny, temperature between 75° and 80°F. The last rainfall, a heavy shower of short duration occurred the night before. At the time of the inspection the pool level was at approximately El 168.6± which is 2 inches above the invert elevation of the box culvert.

b. Embankment

The earth embankment is heavily overgrown with vegetation on both slopes but shows no signs of distress. The horizontal alignment of the crest appears in good condition. The crest has a vertical curve with its lowest point in the vicinity of the box culvert crossing. This curvature, however, does not appear to be caused by settlement but is part of the design profile of Armory Street. (See Photograph). There are locally a few superficial longitudinal and transverse cracks with minor vertical displacements in the roadway and sidewalks which traverse the crest, especially in the vicinity of the box culvert crossing. In general, however, the roadway pavement is in good condition.

The upstream slope of the embankment shows evidence of some erosion and sloughing as a result of runoff, with some erosion as a result of trespassing. The heavy vegetation makes it impossible to discern whether there are cracks on the slope surface. The downstream slope, shows signs of erosion, sloughing and seepage. The causes of the erosion and sloughing are generally the same as those at the upstream slope.

There are two areas of seepage, one located approximately 45 feet south of the spillway chute and covers an area of approximately 300 square feet. In the center of this area, at approximately the toe of the slope at El. 143± a rivulet is flowing at the rate of approximately 5 gpm. It appears that this condition has existed for some time since it was noted in a previous inspection report prepared by the Commonwealth. In the area of seepage there are signs of limonitic staining and algae growth (See Photograph). A second rivulet, at approximately the same elevation, is located in a gully eighty feet south of the spillway chute. The gully has been formed by storm water flowing from a 12 inch diameter concrete bell and spigot drain pipe attached to a roadway catch basin. The gully starts about 20 feet downstream from the edge of the crest and is about 3 feet deep until it reaches the toe. (See Photograph).

Eighty feet north of the spillway chute, another catch basin drain has created a similar gully, however, there is no apparent seepage at this location. At the end of the drain, a pothole has formed, 20 feet in diameter and 5 feet deep. (See Photograph). An attempt has been made to reduce the erosion by the placement of large boulders at the outlet of the pipe. Downstream of the pothole, the drain water has incised a channel approximately 3 feet wide and 3 feet deep. The channel leads directly into the Van Horn Lower Pond.

At the south abutment, there is a small pond which is drained by a brook flowing along the downstream toe of the dam and then into the Van Horn Lower Pond.

c. Appurtenant Structures

The reinforced box culvert appears to be in good condition with only little debris in evidence. The upstream culvert headwalls have separated from the culvert and are displaced upstream approximately 2 inches. (See Photograph). Immediately beyond the headwalls there is riprap protection, approximately 10 ft wide, which has been covered with asphalt; it serves as slope protection against erosion by runoff from the paved crest. (See Photograph). On top of the box culvert, 2-1/2 feet from the upstream edge, a metal pipe approximately 12 inch diameter, covered with asphalt, crosses the culvert. The pipe is anchored by means of two U-bolts to the underside of the roof of the culvert.

The spillway chute which consists of three reinforced concrete monoliths is in relatively good condition. There is evidence of minor spalling of the concrete surface and erosion at the contact of the walls with the floor. The lower downstream section has settled non-uniformly, approximately 4 inches on the south side and 1 inch on the north side, with an approximate downstream displacement of 2 inches. The upper section has separated from the box culvert about 1/2 inch in downstream direction. Riprap protection which surrounds the spillway chute is covered with vegetation and on the south side, near the culvert head wall, it has undergone approximately 6 inches of settlement. At the downstream end of the chute, the riprap has moved probably by flood flows.

The intake for the low level outlet pipe was not visible, however, water was seen emerging at the outlet located below the Van Horn Park Lower Dam. The quantity of flow from the outlet was considerably less than expected, leading to the suspicion that the intake may be clogged.

d. Abutments

There were no signs of seepage or other unusual conditions at the abutments. The only exception is the presence of the pond described above.

e. Downstream Channel

There is for practical purposes no downstream channel. The

spillway chute leads directly into the Van Horn Park Lower Pond. The small channel which does exist is partially blocked with debris but does not, in its present state, impede discharges.

f. Reservoir Area

In the vicinity of the dam there is no evidence of sloughing, potentially unstable slopes or other unusual conditions which would adversely affect the dam.

3.2 EVALUATION OF OBSERVATIONS

Visual observations made during the course of the inspection revealed several deficiencies which at present do not adversely affect the adequacy of the dam. However, these deficiencies do require immediate attention and should be corrected before further deterioration leads to a hazardous condition. Recommended measures to improve these conditions are given in SECTION 7.

SECTION 4: OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

There are no established operational procedures for the project.

4.2 MAINTENANCE OF DAM

There is no operation or maintenance manual for the project. There is no program set up for inspections by City personnel. There is a statewide program of inspection established several years ago by the Department of Environmental Quality Engineering, Division of Waterways. A copy of their last inspection report, dated February 1977, is given in the Appendix.

4.3 MAINTENANCE OF OPERATING FACILITIES

There is no established maintenance program for the operating facilities.

4.4 WARNING SYSTEMS IN EFFECT

There is no warning system in effect or contemplated.

4.5 EVALUATION

The maintenance of the dam and appurtenant structures is virtually non-existent except that repairs to the street pavement are routinely done by the Department of Streets and Engineering personnel.

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 DRAINAGE AREA CHARACTERISTICS

The Van Horn Park Upper Dam controls the drainage from a depressed basin within the City of Springfield, Mass., with no defined drainage channels. The total contributing area is given as 0.41 square mile (262 acres). Of the total area about 62 acres is undeveloped park and 200 acres is developed urban area. A pond with a normal water area of 9.6 acres is located within the park and immediately above the dam. The water area may increase to approximately 19 acres at an elevation corresponding to the top of the dam.

The urban area surrounding the park is served by storm sewers which carry the runoff from frequent storms away from the topographic basin. In a major storm, the runoff would exceed the design capacity of the sewers, and excess runoff would flow overland to the pond.

5.2 SPILLWAY CAPACITY

The spillway for the Van Horn Park Upper Dam is a double box culvert, each barrel is 8 ft wide and 5 ft high, 60 ft long, and is on a slope of 0.5 percent. The culvert is located on the top of the dam (El. 175), with an invert or sill at El. 168.5, or 6.5 feet below the crest of the dam. The design capacity given on construction drawings is 730 cfs, which is estimated to be the capacity with water surface at El. 174.7 and 0.3 feet below the crest of the dam. The design capacity is equal to 1780 cfs per square mile (2.79 cfs per acre).

5.3 RESERVOIR

If the pond were allowed to fill to the crest of the dam, the total storage between the crest and the invert of the culvert would be approximately 96 acre-feet, which is equivalent to 4.4 inches of runoff from the contributing area.

5.4 FLOODS OF RECORD

There are no records of flow from this small drainage area, and no records of the maximum water elevation in the pond.

5.5 DESIGN FLOOD

Because there are no data on Probable Maximum Floods for an area of 0.41 square mile, and particularly for a partially urbanized area, it was necessary to synthesize a design flood hydrograph for the contributing area. Initially a depth-duration relation for maximum probable point rainfall (10 square mile area), for durations from 6 hours to 24 hours, was taken from Weather Bureau

sources.[1] The distribution of the rainfall for durations from 1 to 6 hours was based on data in a publication of the World Meteorological Organization.[2] An estimate of a probable Design Storm was made considering the approximate relation that the flood derived from such a storm is about half the Probable Maximum Flood. Increments of depth from the depth-duration relation at one-hour intervals were arranged in a probable storm sequence given below:

Time (hours)	Precipitation (inches)
1.0	0.16
2.0	0.50
3.0	1.10
4.0	2.65
5.0	4.50
6.0	1.40
7.0	0.85
8.0	0.16
9.0	0.16
	11.48

Since runoff to the pond area will be overland flow from a narrow strip of land (averaging about 1500 ft in width), it was assumed that there would be no significant lag time and the runoff rate would be computed directly from the rate of precipitation. Also, because approximately 84 percent of the contributing area will be impervious urban area or water area, no infiltration losses were deducted. The resulting inflow hydrograph has a one-hour duration peak discharge of 1180 cfs and a runoff volume equivalent to 11.5 inches in 9 hours, 96 percent of which occurs in 6 hours. The hydrograph assumptions are conservative, but believed to be necessary in the evaluation of the adequacy of the dam.

5.6 OVERTOPPING POTENTIAL

The adequacy of the spillway capacity has been tested by routing one-half the Probable Maximum Flood (see Par. 5.5) through the reservoir using a computerized routing technique. The water surface was assumed to be at the invert of the spillway box culvert (El 168.5) at the beginning of inflow. The routed flood came within 0.2 feet of overtopping at the dam (El. 175), and the maximum discharge was 755 cfs.

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(1) Generalized Estimated of Maximum Possible Precipitation over the United States East of the 105th Meridian, Hydrometeorological Report No. 23, 1947.

(2) Manual for Estimation of Probable Maximum Precipitation, World Meteorological Organization, Operation Hydrology Report No. 1, 1973.

5.7 EVALUATION

Since the dam is not expected to be overtopped with an inflow to the pond equal to the runoff from one half the Probable Maximum Flood, it is considered that the dam design is adequate from a hydrologic and hydraulic standpoint.

SECTION 6: STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

Visual observations did not indicate any serious structural problems with the embankment, spillway chute or double box culvert. The deficiencies, which are described in Sections 3 and 4, require immediate attention; recommended remedial measures to improve these conditions are given in Section 7.

b. Design and Construction Data

No design computations or other data regarding the structural stability of the dam have been located.

On the basis of the performance experience, the visual inspection, as well as engineering judgement, the dam with the present reservoir level, is considered adequate.

c. Operating Records

There are no operating records kept or available. There are no records or reports of any operational problems which would affect the stability of the dam.

d. Post-construction Changes

It is reported that the dam was built sometime around 1900. There are no records of any construction changes that may have taken place prior to 1957. In 1957 Green Engineering Affiliates, Inc. Boston, Mass., undertook the design of the present box culvert and spillway chute. Details of the construction are not available.

e. Seismic Stability

The dam is located in Seismic Zone No. 2 and in accordance with recommended Phase I guidelines does not warrant seismic analyses.

SECTION 7: ASSESSMENT, RECOMMENDATIONS & REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety

Phase I investigation of Van Horn Park Upper Dam does not indicate conditions which would constitute an immediate hazard to human life or property. Based on engineering judgment and the performance of the outlet works and earth embankment, the project is considered to be adequate under present conditions. The dam project however, does have a number of deficiencies which, if not remedied within a short time, have the potential for developing into hazardous conditions.

Because there are no data on Probable Maximum Floods for a drainage area of this size and condition, a design flood hydrograph was synthesized for the contributing area. An estimate of a probable Design Storm was developed considering the approximate relation that the flood derived from such a storm is about half the Probable Maximum Flood. The resulting inflow hydrograph has a one-hour duration peak discharge of 1180 cfs and a runoff volume equivalent to 11.5 inches in 9 hours. Routing this flood through the reservoir using computerized techniques, resulted in a maximum discharge of 755 cfs with the pool rising to within 0.2 feet of the dam crest.

Since the dam is not expected to be overtopped with an inflow to the pond equal to the runoff from one half the Probable Maximum Flood, it is considered that the dam design is adequate from a hydrologic and hydraulic standpoint.

b. Adequacy of Information

Information and data available have been found adequate for the Phase I investigation. However, there is a lack of information with regard to operation and maintenance of the project, as follows:

1. Record drawings and computations for the project
2. Operation and maintenance manuals
3. Records of hydrologic data

c. Urgency

The recommendations and remedial measures described below should be implemented by the owner within the next 12 months.

d. Necessity for Additional Investigations

Additional investigations to assess the adequacy of the dam and appurtenant structures do not appear necessary.

7.2 RECOMMENDATIONS

It is recommended that to correct deficiencies the following measures be undertaken by the owner shortly:

a. Gullys and channels formed on the downstream slope should be filled with suitable compacted embankment material and restored to grade.

b. Joints between box culvert and headwall, headwall and spillway chute, and between spillway chute sections should be sealed with appropriate joint filler material to prevent any further washing out of foundation materials.

c. Riprap protection at the downstream end of the spillway chute should be cleared, rebuilt and inspected regularly, especially following heavy storms.

d. Debris in the downstream channel should be removed and hauled away.

e. Provisions should be made to remove the pond, located at the south abutment, and divert the brook away from the downstream toe.

f. Heavy bush, shrubs, and young saplings should be removed from all locations on the embankment, Larger trees should not be removed but should be inventoried and their condition monitored. If a tree dies, the area around the tree should then be included in the inspection program for seepage.

7.3 REMEDIAL MEASURES

a. Alternatives

Not Applicable.

b. O & M Maintenance and Procedures

The owner should undertake shortly the following measures:

(1) Establishment of a systematic program of observation and monitoring of changes in quantity of seepage and suspended solids. Observations can be accomplished by the installation of weirs or flow meters. To control the seepage in the areas mentioned, and to obviate the possibility of piping and boiling, it may be necessary to construct a reverse filter

blanket with a weight berm. The filter layer should be made to "daylight" at the shoreline of the Lower Pond.

(2) Establishment of a systematic program of inspection and monitoring of structural movements. This can be accomplished by the installation of simple measuring gauges or by the use of surveyed reference points.

(3) Discharges from roadway drains should not be allowed to flow on the downstream slope. Drain pipes should be extended beyond the toe and made to outfall directly into Van Horn Park Lower Pond.

(4) A formal program of operations, maintenance and inspection should be initiated.

VISUAL INSPECTION CHECK LIST

APPENDIX A

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT VANHORN PARK UPPER DAM

DATE 6/1/78

TIME 13:30

WEATHER Sunny.

W.S. ELEV. 168.5 U.S.,
W.S. ELEV. 146.5 DN.S

PARTY:

1. Harvey S. Feldmen
2. Jyotindra H. Patel.
3.
4.
5.
6.
7.
8.
9.
10.

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	All project features inspected jointly by Party members		
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

PERIODIC INSPECTION CHECK LIST

PROJECT VAN HORN PARK UPPER DAM DATE 6/1/78

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

DAM EMBANKMENT

Crest Elevation _____

Current Pool Elevation _____

Maximum Impoundment to Date _____

Surface Cracks asphalt pavement on crest shows longitudinal & transverse cracks in region of box culvert. Sidewalks shows evidence of minor vertical displacement

Pavement Condition Generally in good condition on roadway and sidewalk except as noted above.

Movement or Settlement of Crest As noted above. Vertical alignment of the crest appears to dip with the lowest point in the vicinity of the box culvert. It appears this curvature is not a result of settlement but design profile of the road.

Lateral Movement None visible

Vertical Alignment No major deformation except noted above

Horizontal Alignment No major deformation

Condition at Abutment and at Concrete Structures Generally in good condition except noted below

Indications of Movement of Structural Items on Slopes upstream Headwall of box culvert has been displaced towards upstream and seperated from box section 32

Trespassing on Slopes Some evidence of pathways on both slopes

Sloughing or Erosion of Slopes or Abutments Some sloughing and erosion on both slopes

Rock Slope Protection - Riprap Failures Riprap around chute has settled; At lower end of chute riprap is displaced

Unusual Movement or Cracking at or near Toes None visible because of heavy vegetation

Unusual Embankment or Downstream Seepage Two seepage noted at downstream toe; One located 45ft from the south of the spillway chute, saturated area 10'x30'; second is at 80ft south of the spillway chute in a channel formed due to the storm flow from roadway drains. Also see misc. comments below.

Piping or Boils _____

Foundation Drainage Features None Visible

Toe Drains None Visible

Instrumentation System None Visible

Miscellaneous. Seepage flow in the first location is approximately 5 gal/min. On downstream face, two gullies were created by discharge from roadway drains. One at 80 ft South of spillway chute. This gully starts about 20ft downstream from the edge of the crest and is about 3 feet deep untill it reaches the toe where it is at ground level. Second gully is approximately 20 feet [illegible] of the spillway chute. In the vicinity of the outlet of the drain, a pothole has been formed approximately 20ft diameter 5 ft deep. An attempt has been made to reduce the erosion by the placement of large boulders at the outlet of the pipe. Downstream of the pot hole the drain water has created an incised channel approximately 3 feet wide and 3 feet deep. This channel leads directly into the Van Horn Lower Pond.

PERIODIC INSPECTION CHECK LIST

PROJECT VAN HORN PARK UPPER DAM DATE 6/1/78

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE

a. Approach Channel None

Slope Conditions _____

Bottom Conditions _____

Rock Slides or Falls _____

Log Boom _____

Debris _____

Condition of Concrete Lining _____

Drains or Weep Holes _____

b. Intake Structure Two 8'x5' Box Culverts.

Condition of Concrete Generally in good condition

Stop Logs and Slots _____

Miscellaneous Slight debris in the culverts; 1/2" of running water on the culvert floor.

PERIODIC INSPECTION CHECK LIST

PROJECT VAN HORN PARK UPPER DAM DATE 6/1/78

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

OUTLET WORKS - OUTLET STRUCTURE AND
OUTLET CHANNEL : SPILLWAY CHUTE

General Condition of Concrete Generally in good condition except noted below

Rust or Staining None observed.

Spalling Minor spalling

Erosion or Cavitation Substantial erosion of concrete at contact between walls & floor.

Visible Reinforcing None observed

Any Seepage or Efflorescence None observed

Condition at Joints Lower monolith of the chute has settled non uniformly, 4" on South wall and floor and 1" on North wall and floor with downstream separation of approximately 2". Upper monolith of the chute has separated from box culvert about 1/2" downstream

Drain Holes None.

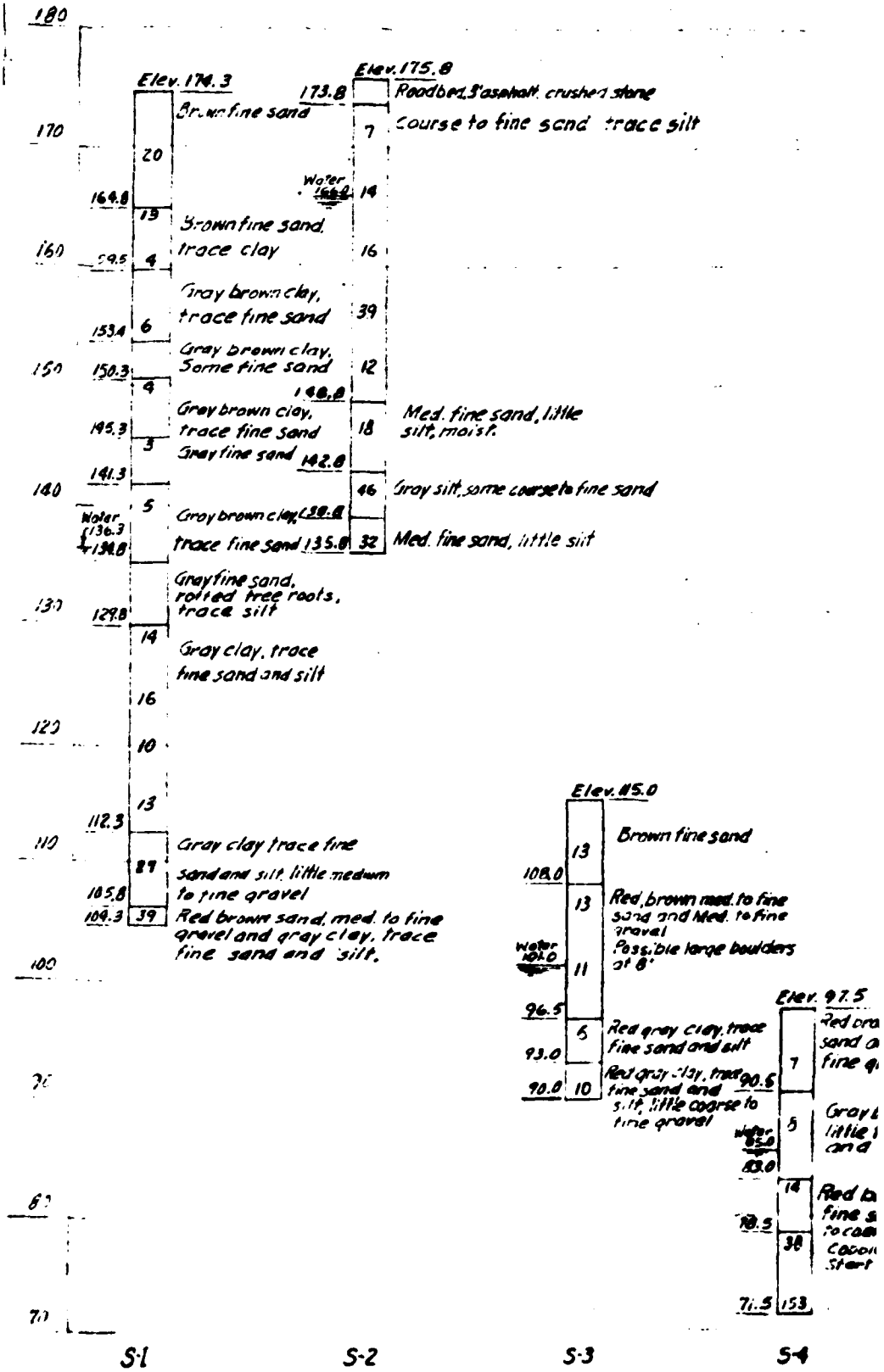
Channel Downstream channel flows into lower pond of Van Horn Park.

Loose Rock or Trees Overhanging Channel _____

Condition of Discharge Channel Riprap at the end of the chute have been displaced towards the pond. Partial blockage with debris.

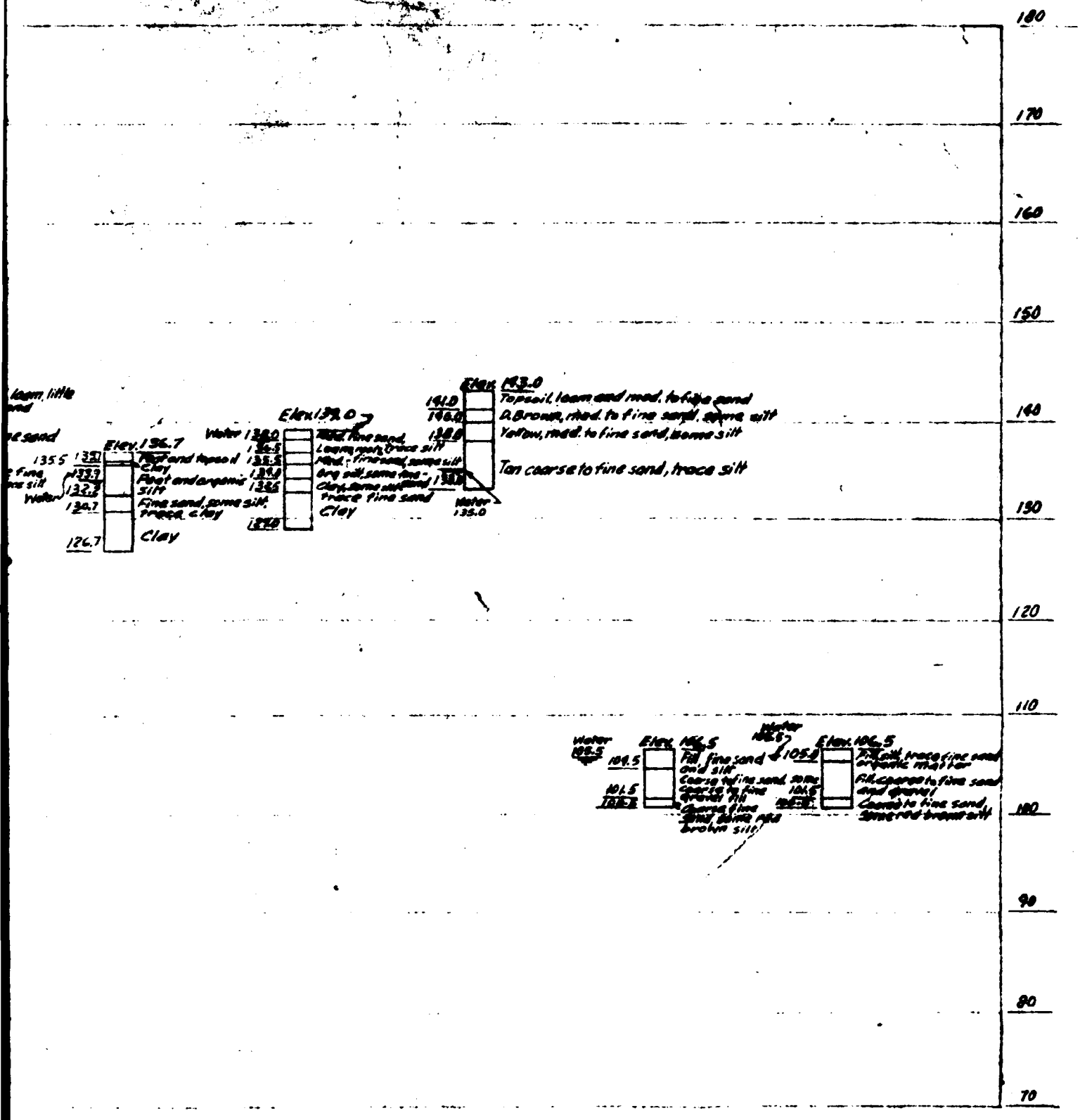
DRAWINGS AND INSPECTION REPORTS

APPENDIX B

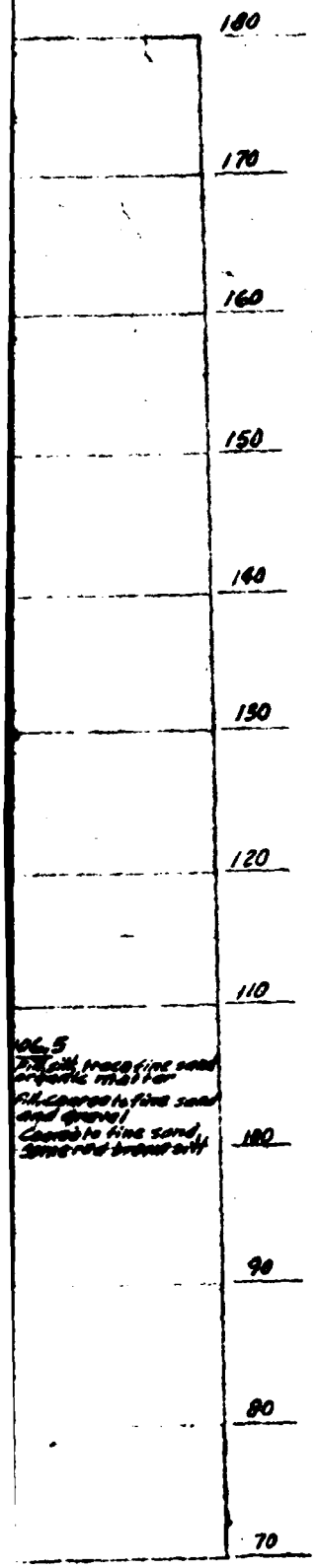

180
170
160
150
140
130
120
110
100
90
80
70
Elev. 174.3
Brown fine sand
20
164.8
19
Brown fine sand, trace clay
159.5
4
Gray brown clay, trace fine sand
153.4
6
Gray brown clay, some fine sand
150.3
4
Gray brown clay, trace fine sand
145.3
5
Gray fine sand
141.3
5
Gray brown clay, trace fine sand
Water (136.3)
134.8
Gray fine sand, rotted tree roots, trace silt
129.8
14
Gray clay, trace fine sand and silt
16
10
13
112.3
Gray clay trace fine sand and silt, little medium to fine gravel
87
105.8
109.3
39
Red brown sand, med. to fine gravel and gray clay, trace fine sand and silt.
Elev. 175.8
173.8
Roadbed, Basalhalt, crushed stone
7
Course to fine sand trace silt
Water 166.8
14
16
39
12
148.8
18
Med. fine sand, little silt, moist.
142.8
46
Gray silt, some course to fine sand
138.8
32
Med. fine sand, little silt
135.8
Elev. 115.0
13
Brown fine sand
108.0
13
Red, brown med. to fine sand and Med. to fine gravel
Possible large boulders at 8'
Water 101.0
11
96.5
6
Red gray clay, trace fine sand and silt
93.0
90.0
10
Red gray clay, trace fine sand and silt, little coarse to fine gravel
Elev. 97.5
7
90.5
5
Water 85.0
83.0
14
69.5
38
71.5
153
S-1
S-2
S-3
S-4

BORING DATA
January 1957

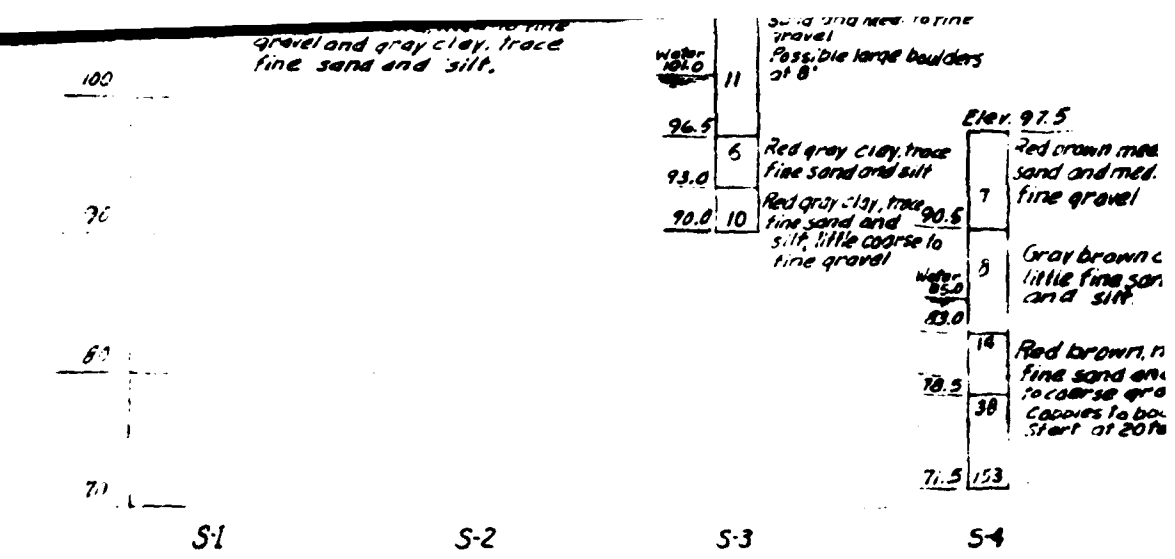
"S" denotes wash bo
"A" denotes auger b
See sh. 1 & 3 of 6 fo

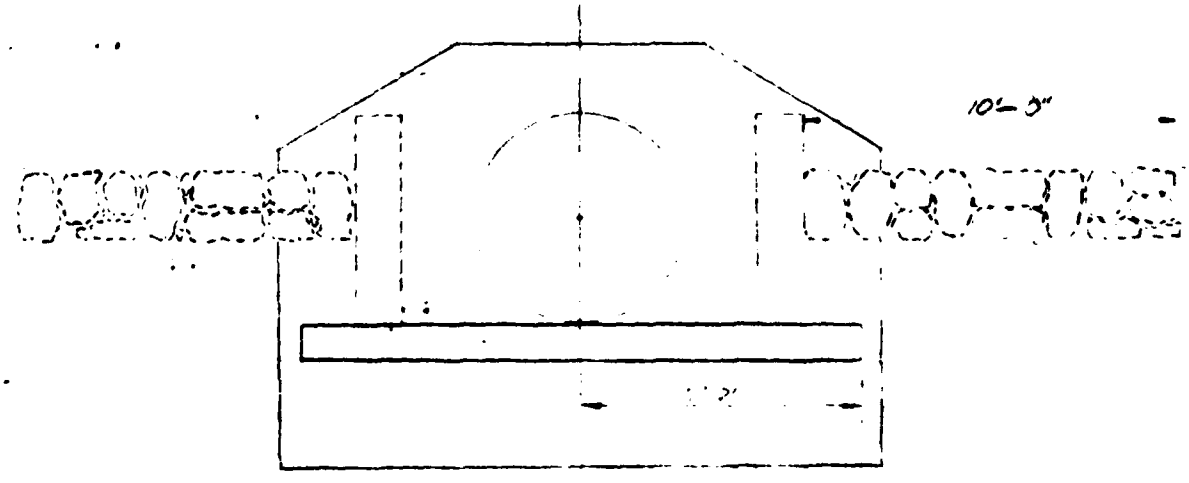


"S" denotes wash boring.
"A" denotes auger boring.
See sh. 1 of 3 of E for locations shown thus - ●



Note:





ELEVATION - SHOWING RIPRAP

ENDWALL

Sca

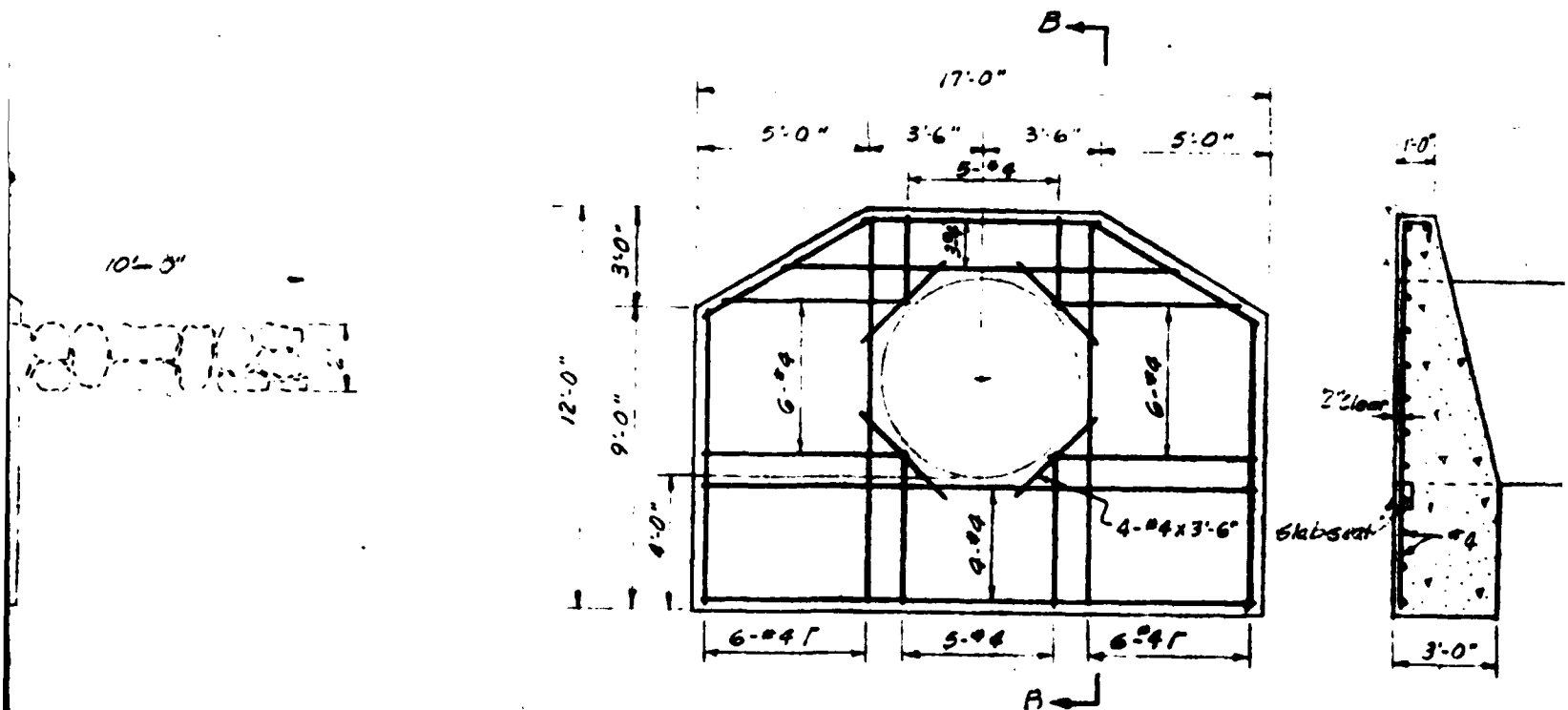
Elev. 97.5

	7	Red brown med. to fine sand and med. to fine gravel
90.5	8	Gray brown clay, little fine sand and silt
Water 85.0		
83.0	14	Red brown, med. to fine sand and med. to coarse gravel
78.5	38	Cobbles to boulders Start at 20 to 26 ft.
71.5	153	

S-4 S-5 A-1 A-2 A-3 A-4 A

BORING DATA
January 1957

"S" denotes wash boring.
"A" denotes auger boring.
See sh. 1 of 3 of E for locations shown



10'-3"

ELEVATION - SHOWING REINFORCING

SECTION B-E
Scale: 1/4" = 1'-0"

ENDWALL AT STA. 3+01.58
Scale: 1/4" = 1'-0"

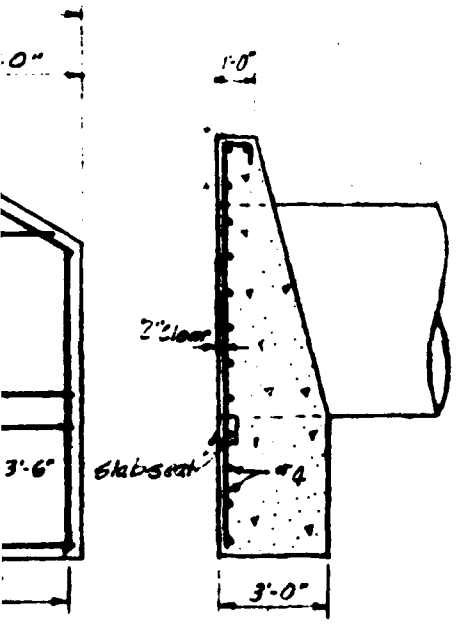
90

80

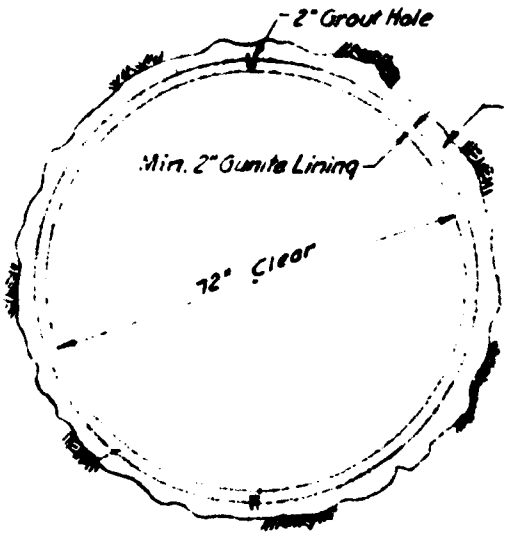
70

A-4 A-5 A-6 A-7

. wash boring.
s auger boring.
'3 of e for locations shown thus – ●



SECTION B-B
Scale: ½" = 1'-0"



TYPICAL SECTION
Lower Pond Outlet Conduit in Tunnelled Section
Scale: ½" = 1'-0"

RCING

7

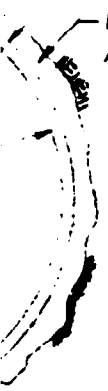
90

80

70

Note:
For General Notes see Sheet No. 3 of 8

...le



Voids outside conduit pressure grouted full

Steel conduit-Liner
& or Jacked prefabricated pipe.
5 gage for over 20' cover
10 gage for under 20' cover

...TION
...in Tunnelled Section
...0"

PROPOSED OUTLET WORKS
VAN HORN PARK
SPRINGFIELD, MASS.
DEPARTMENT OF PUBLIC WORKS OF MASSACHUSETTS
DIVISION OF WATERWAYS

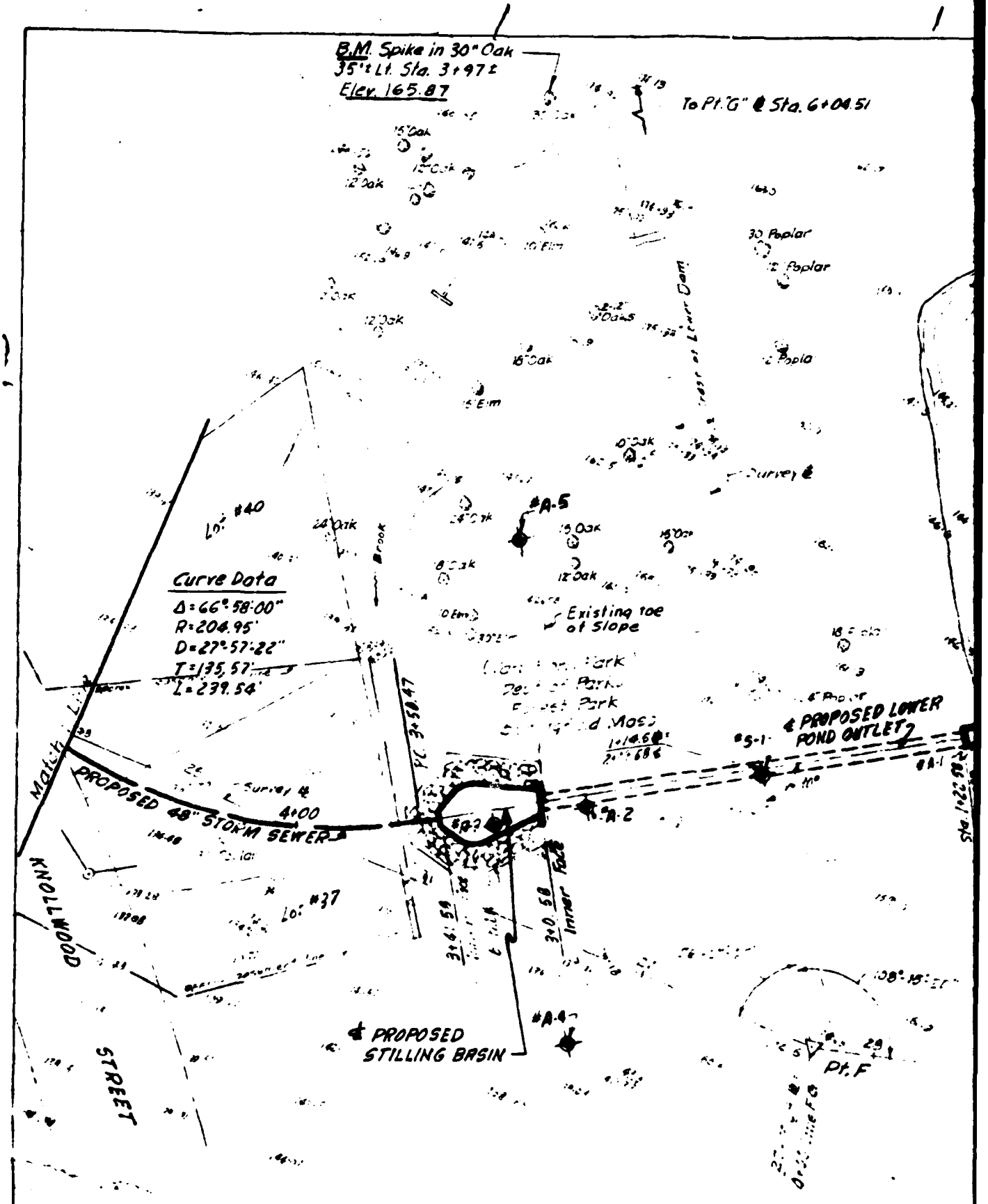
BORINGS & MISCELLANEOUS DETAILS

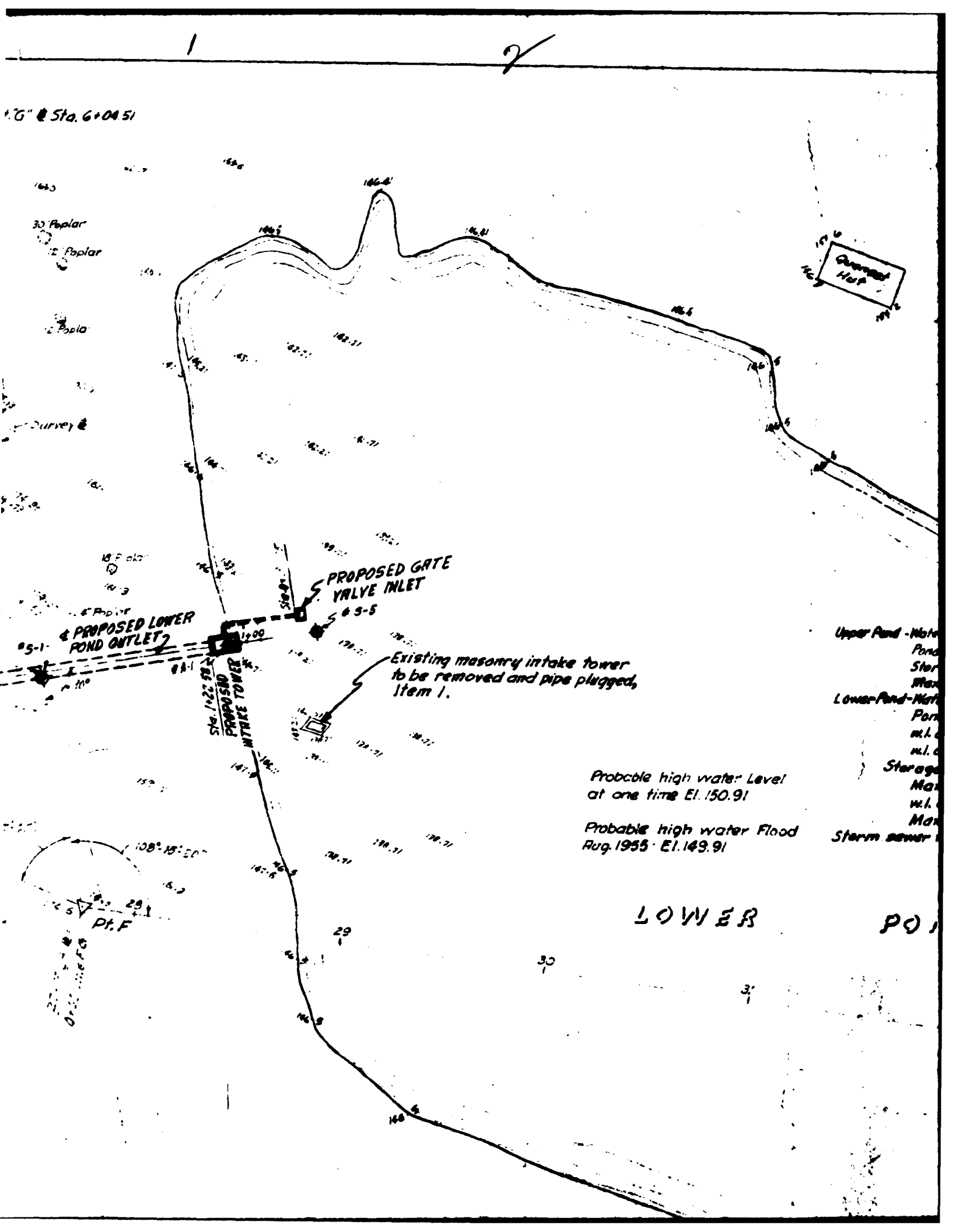
SHEET ... & OF ...

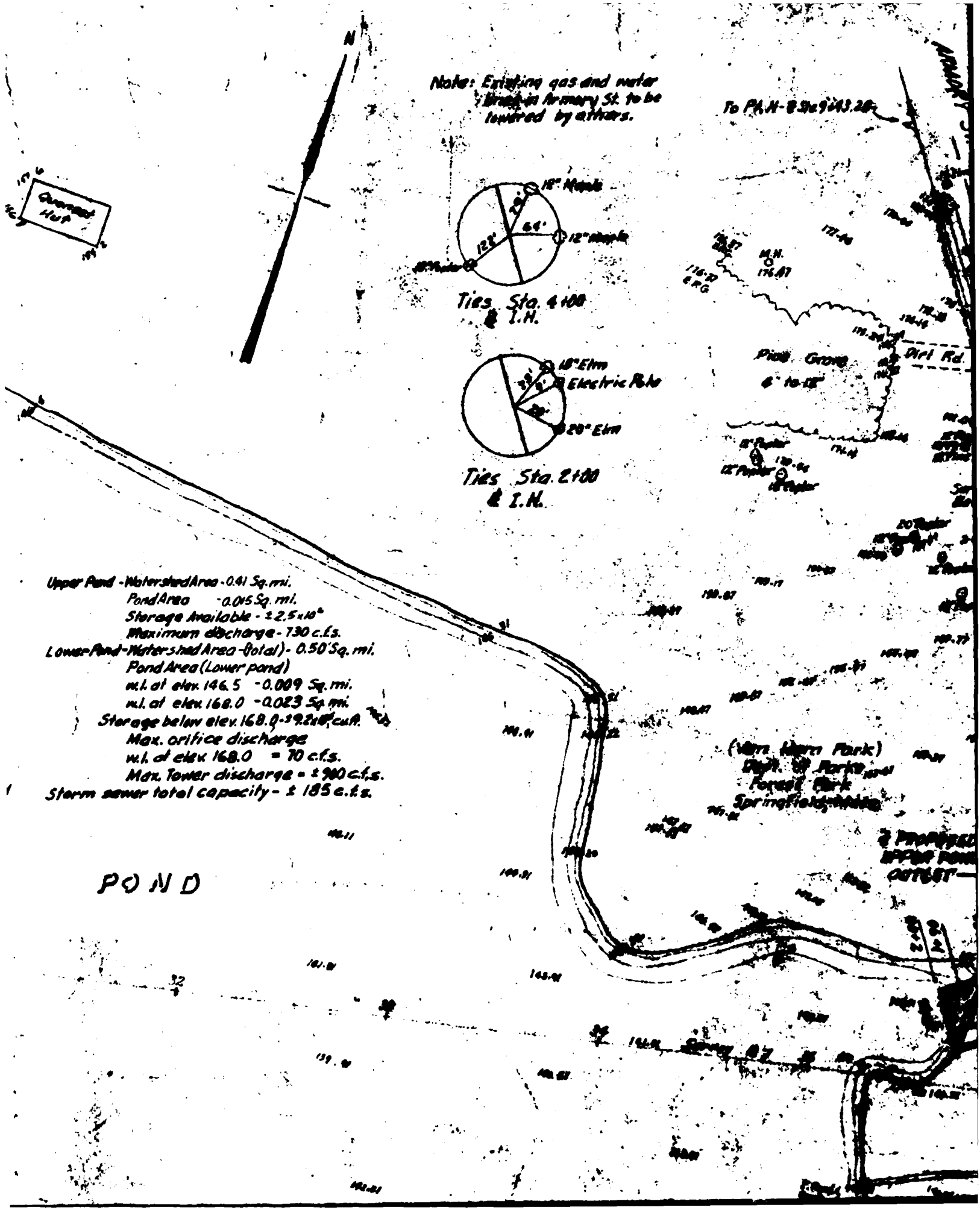
GREEN ENGINEERING AFFILIATES, INC.
ENGINEERS BOSTON

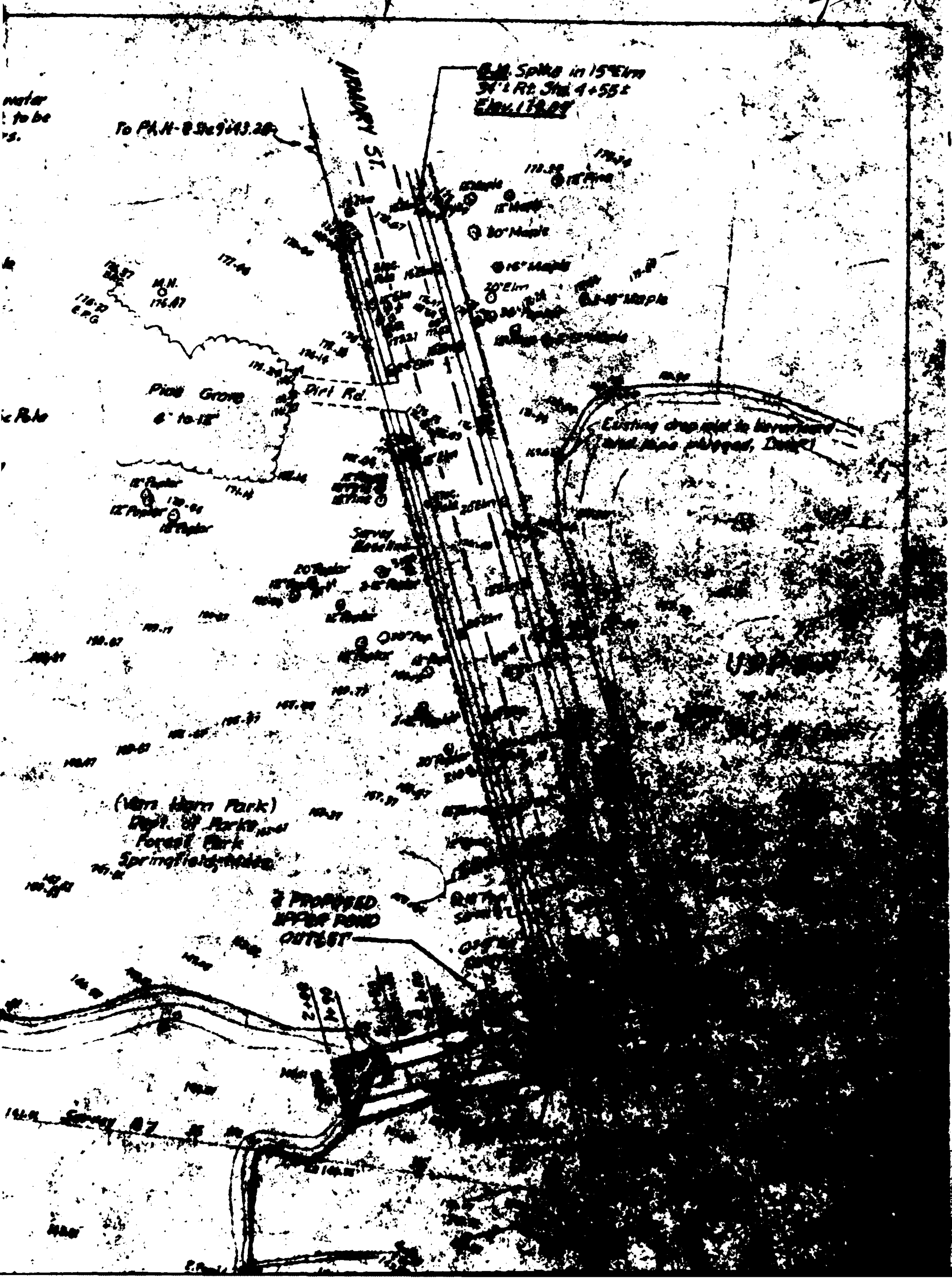
DESIGNED: DEC
DRAWN: E.L.S.
CHECKED: H.D.N.
SCALE: AS SHOWN
DATE: MARCH, 1957
CONTRACT NO. 1743

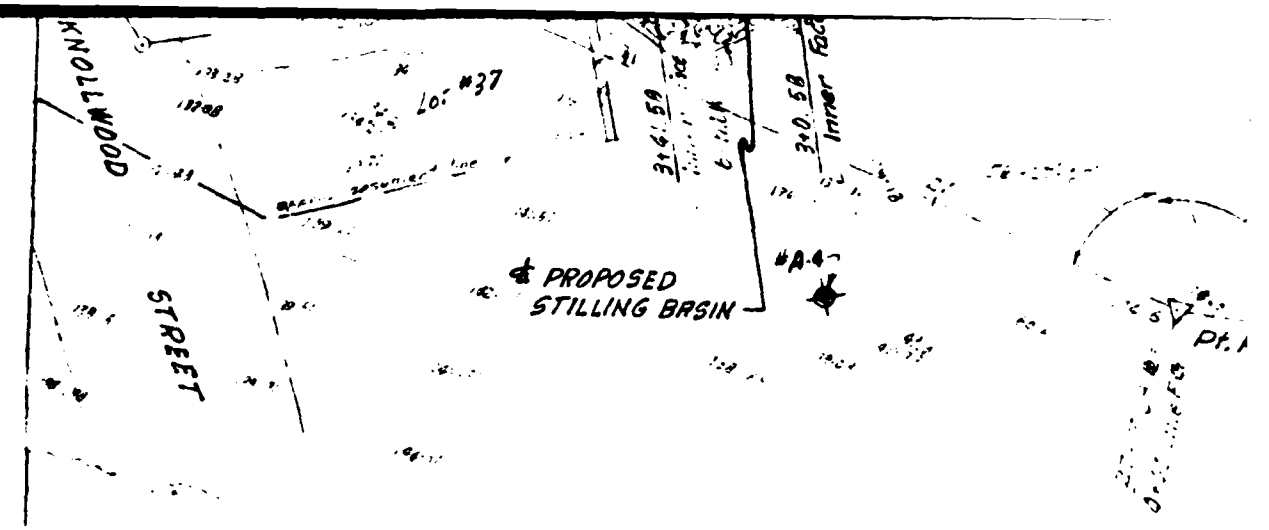
Robert B. Mc...
CHIEF WATERWAYS ENGINEER
ACC. 036548

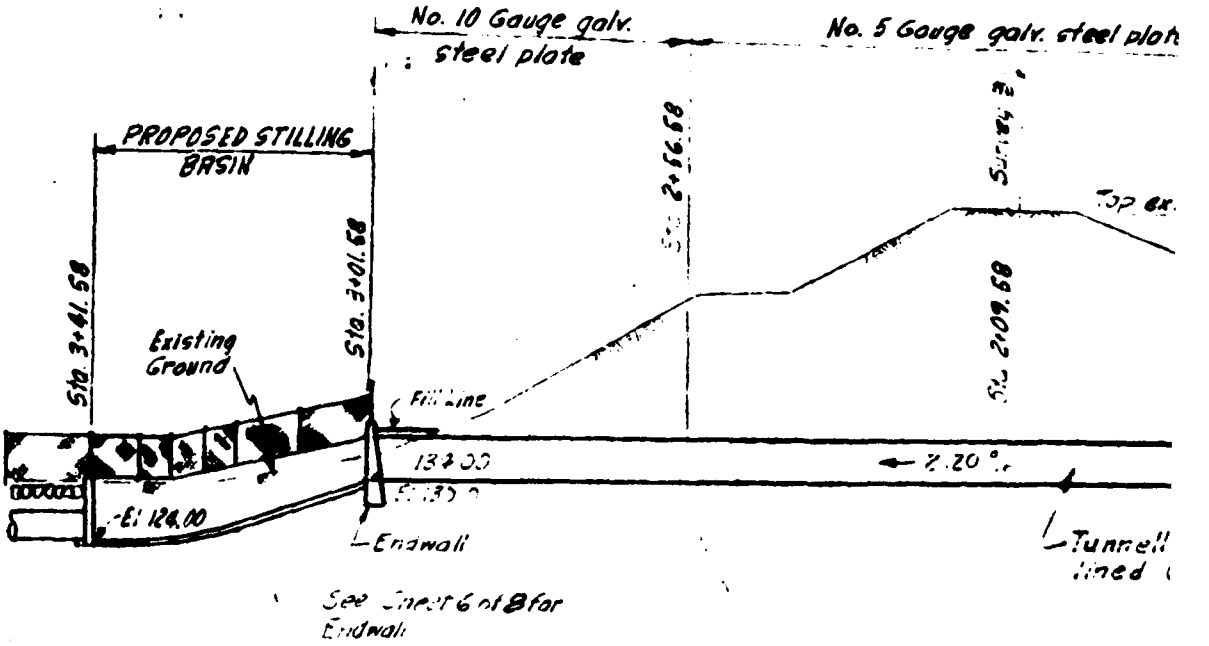

B.M. Spike in 30" Oak
35'± Lt. Sta. 3+97±
Elev. 165.87
To Pt. G" @ Sta. 6+04.51
30 Poplar
12 Poplar
Curve Data
Δ = 66° 58' 00"
R = 204.95'
D = 27° 57' 22"
T = 135.57'
L = 239.54'
Existing toe of slope
PROPOSED 48" STORM SEWER
4+00
PROPOSED LOWER POND OUTLET
PROPOSED STILLING BASIN
KNOLLWOOD STREET
Lot #40
Lot #37
Pt. F


1
2
'G" @ Sta. 6+04.51
30 Poplar
2 Poplar
Poplar
Survey
Quonset Hut
PROPOSED GATE VALVE INLET
Sta 6+
S-5
PROPOSED LOWER POND OUTLET
1+00
S-1
Existing masonry intake tower to be removed and pipe plugged, Item 1.
INTAKE TOWER
CHIMNEY
Probable high water Level at one time El. 150.91
Probable high water Flood Aug. 1955 · El. 149.91
Upper Pond - Wate
Pond
Stor
Max
Lower Pond - Wat
Pon
m.l.
m.l.
Storage
Ma
w.l.
Ma
Storm sewer
108° 15' 20"
Pt. F
LOWER
PO
29
30
31


N
Note: Existing gas and water lines in Armory St. to be lowered by others.
To P.N.H-B Sta 9+43.26
Quonset Hut
18" Maple
64°
12" Maple
Ties Sta. 4+00 & I.H.
18" Elm
Electric Pole
20" Elm
Ties Sta. 2+00 & I.H.
M.H.
116.87
Pine Grove
6" to 12"
Dirt Rd.
Upper Pond - Watershed Area - 0.41 Sq. mi.
Pond Area - 0.015 Sq. mi.
Storage Available - ± 2.5 x 10⁶
Maximum discharge - 730 c.f.s.
Lower Pond - Watershed Area (Total) - 0.50 Sq. mi.
Pond Area (Lower pond)
w.l. at elev. 146.5 - 0.009 Sq. mi.
w.l. at elev. 168.0 - 0.023 Sq. mi.
Storage below elev. 168.0 - ± 92 x 10⁶ cu. ft.
Max. orifice discharge
w.l. at elev. 168.0 = 70 c.f.s.
Max. Tower discharge = ± 900 c.f.s.
Storm sewer total capacity - ± 185 c.f.s.
POND
(Mem. Mem. Park)
Forest Park
Springfield
PROPOSED UPPER POND OUTLET
Spring St.


B.M. Spike in 15" Elm
34'± Rt. Sta. 4+55±
Elev. 179.09
To P.I. N-8 Sta 9+43.28
ST.
30" Maple
16" Maple
20" Elm
M.H.
Dirt Rd.
Pine Grove
6" to 12"
Existing drop inlet to be
pipe plugged
Survey
(Van Horn Park)
Dept. of Parks
Forest Park
Springfield, Mass.
PROPOSED
UPPER POND
OUTLET





See Sheet 6 of 8 for
Endwall

SECTION THRU LOWER

SCALE 1" = 20'-

Probcole high water Level at one time El. 150.91

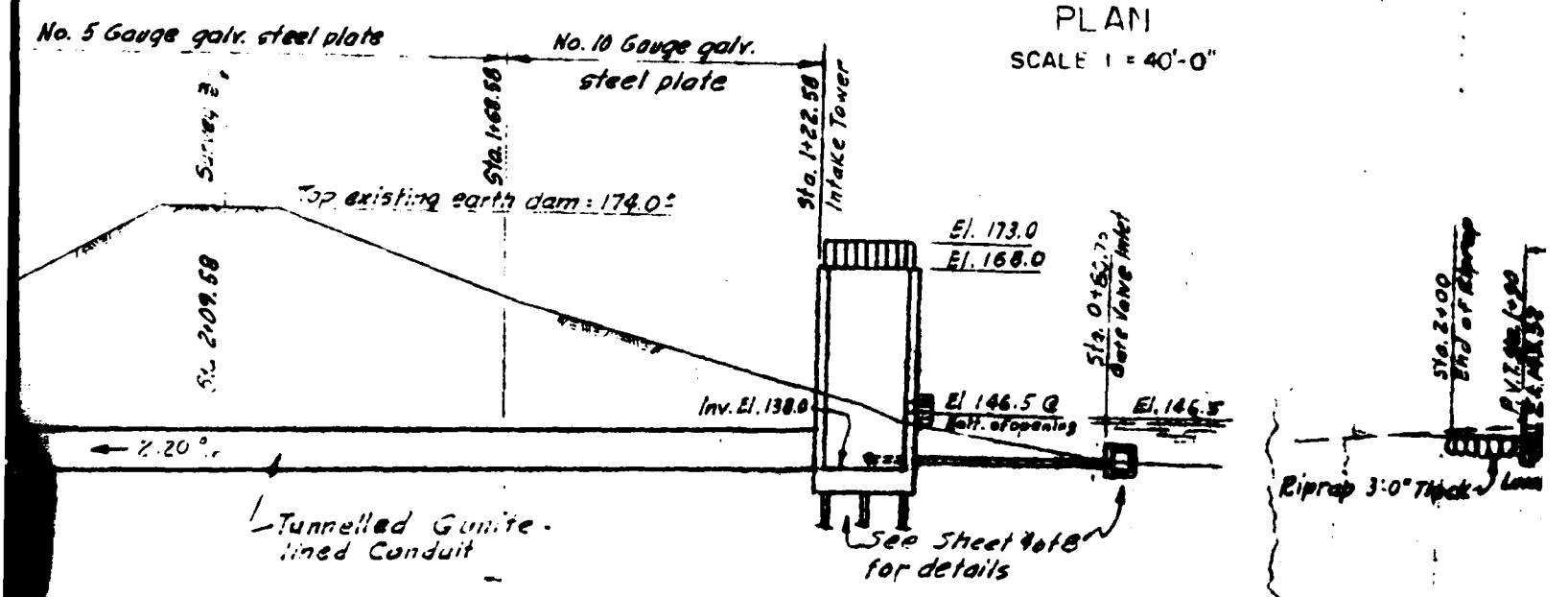
Probable high water Flood Aug. 1955 · El. 149.91

LOWER

Pt. F

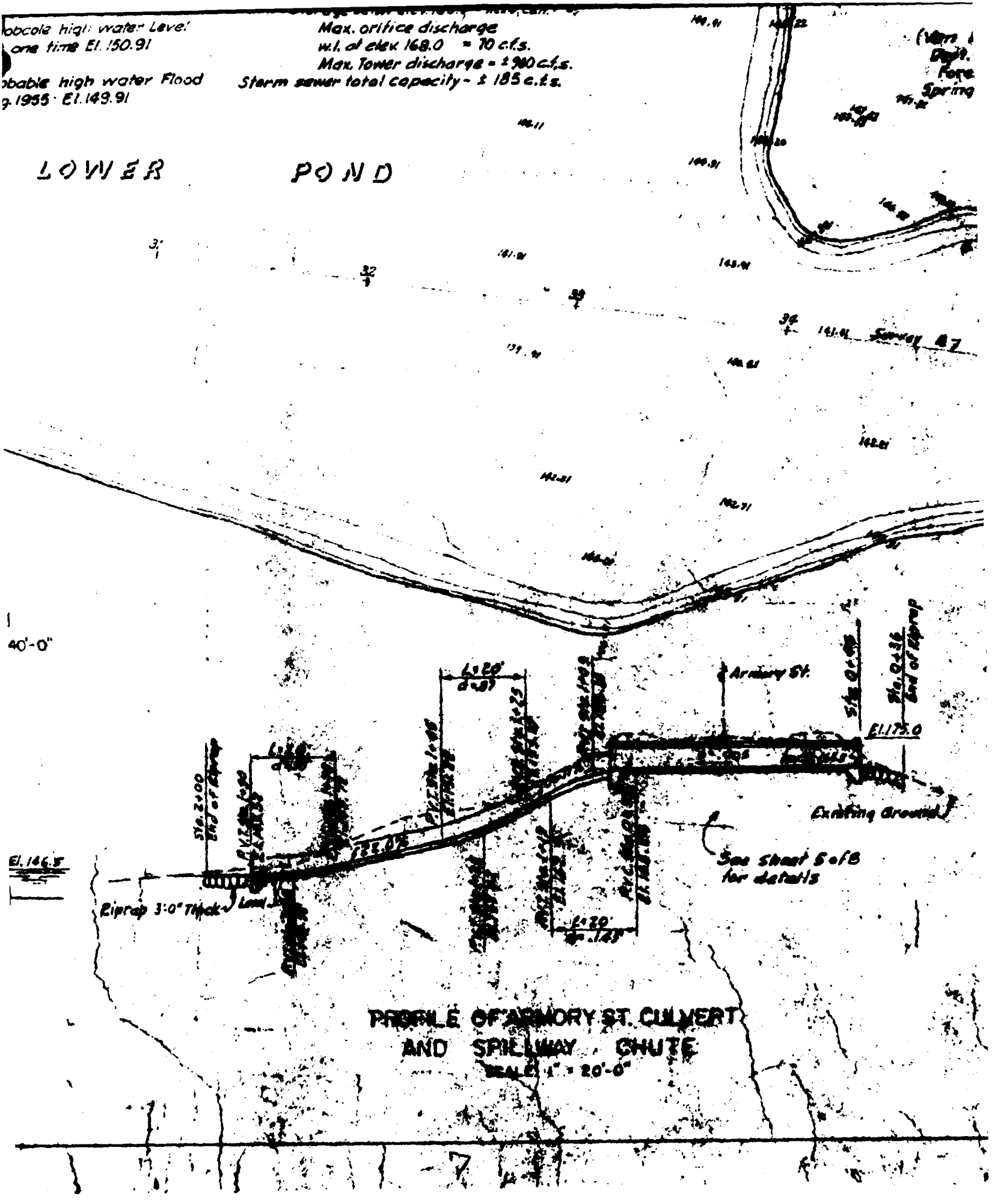
PLAN

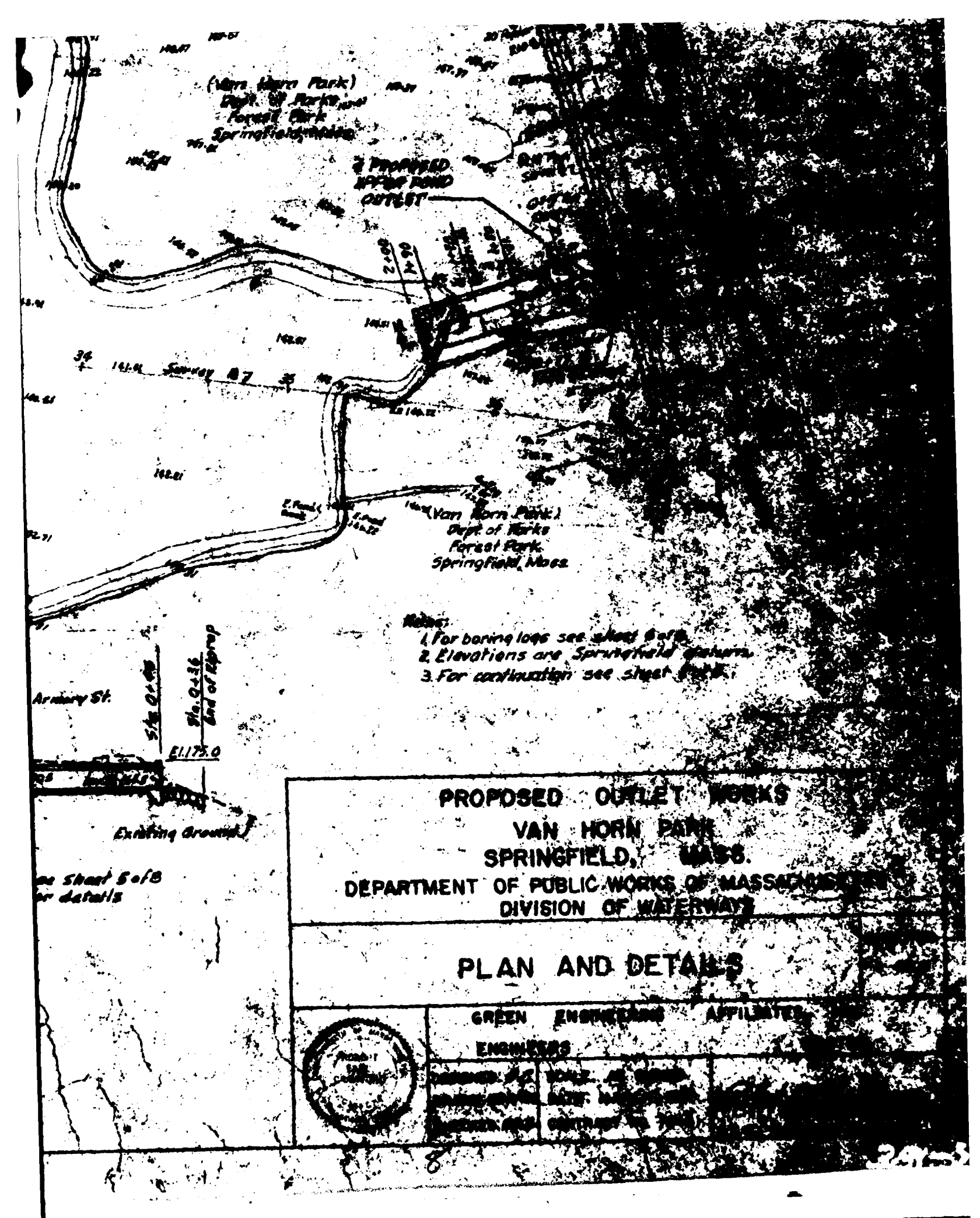
SCALE 1 = 40'-0"



TION THRU LOWER DAM OUTLET

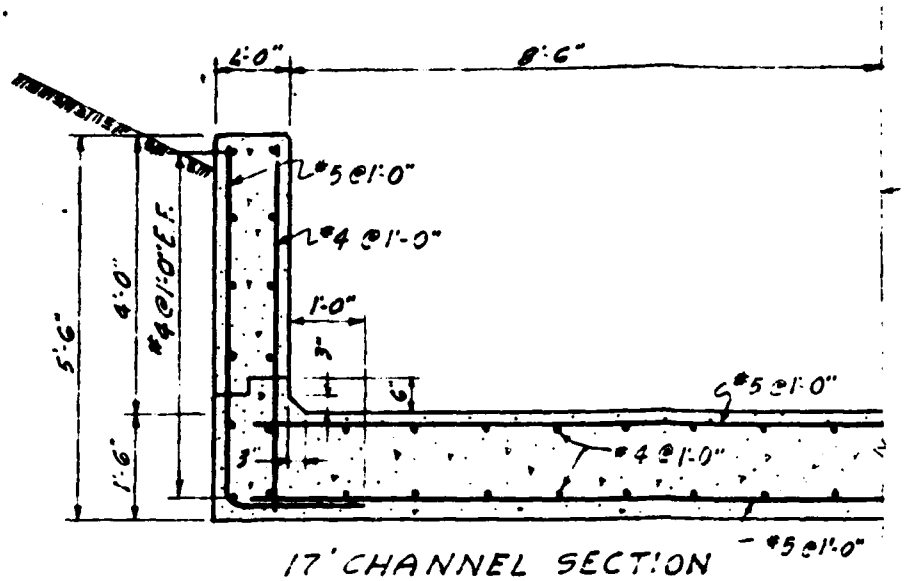
SCALE 1" = 20'-0"


obcole high water Level
one time El. 150.91
obable high water Flood
g. 1955 - El. 149.91
Max. orifice discharge
w.l. at elev 168.0 = 70 c.f.s.
Max. Tower discharge = ± 900 c.f.s.
Storm sewer total capacity - ± 185 c.f.s.
LOWER POND
Survey 87
40'-0"
Armory St.
El. 175.0
Existing ground
See Sheet 5 of 8 for details
El. 146.5
Riprap 3:0" Thick
PROFILE OF ARMORY ST. CULVERT AND SPILLWAY CHUTE
SCALE: 1" = 20'-0"



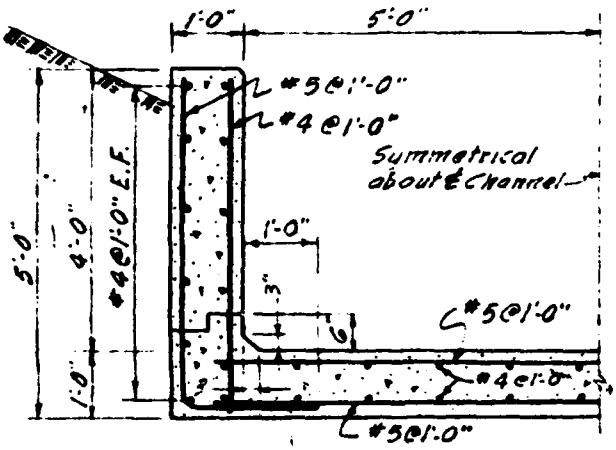
Notes:
1. For boring logs see sheet 6 of 8.
2. Elevations are Springfield datum.
3. For continuation see sheet 5 of 8.

See Sheet 5 of 8 for details



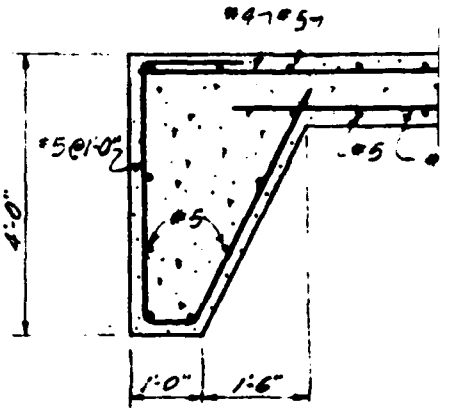
17' CHANNEL SECTION

Scale: ½"=1'-0"



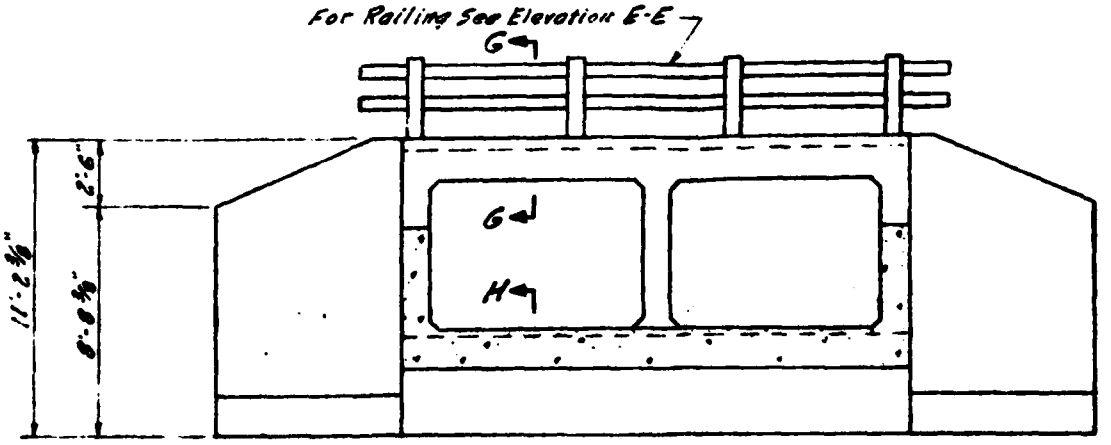
10' CHANNEL SECTION

Scale: ½"=1'-0"



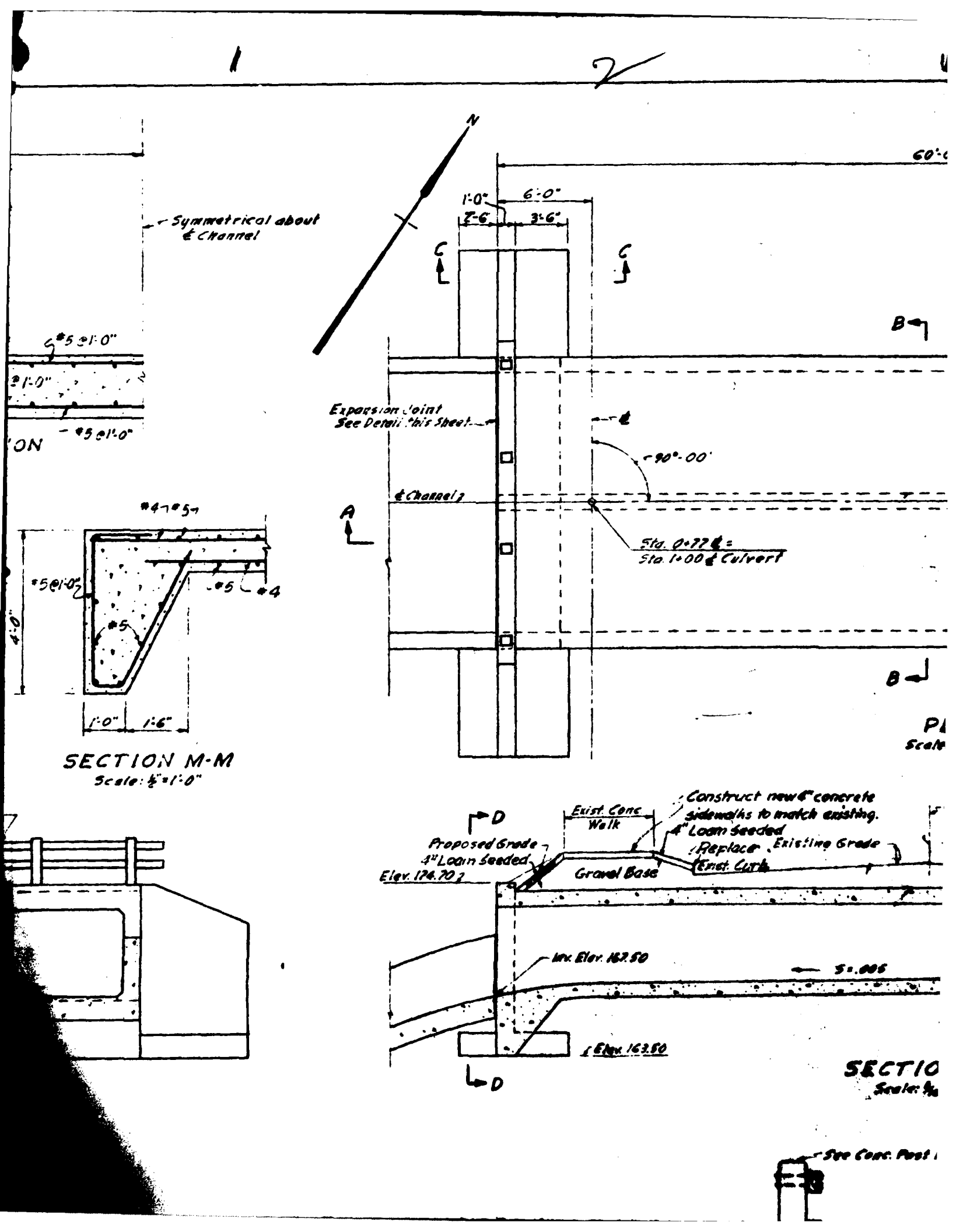
SECTION M-M

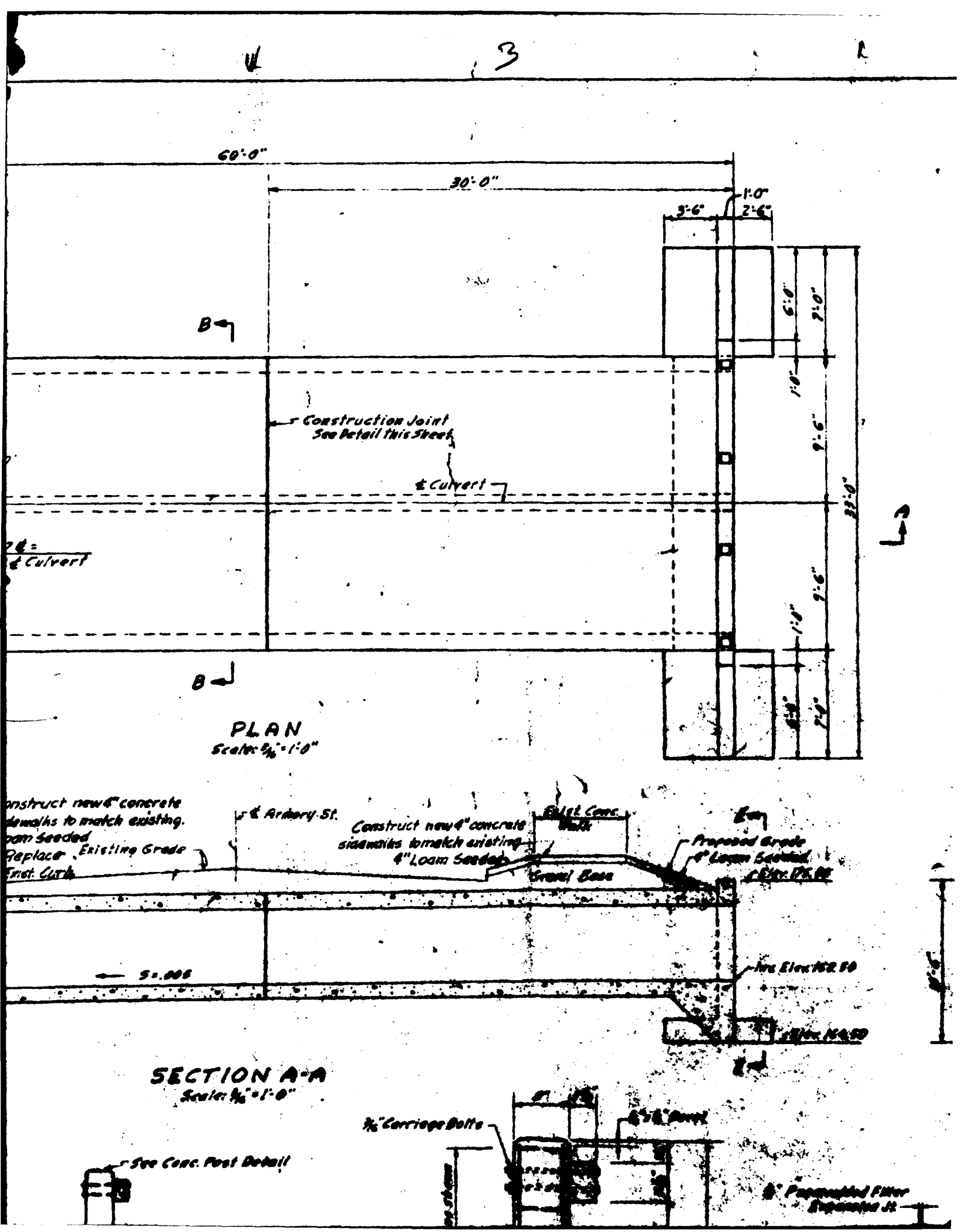
Scale: ½"=1'-0"

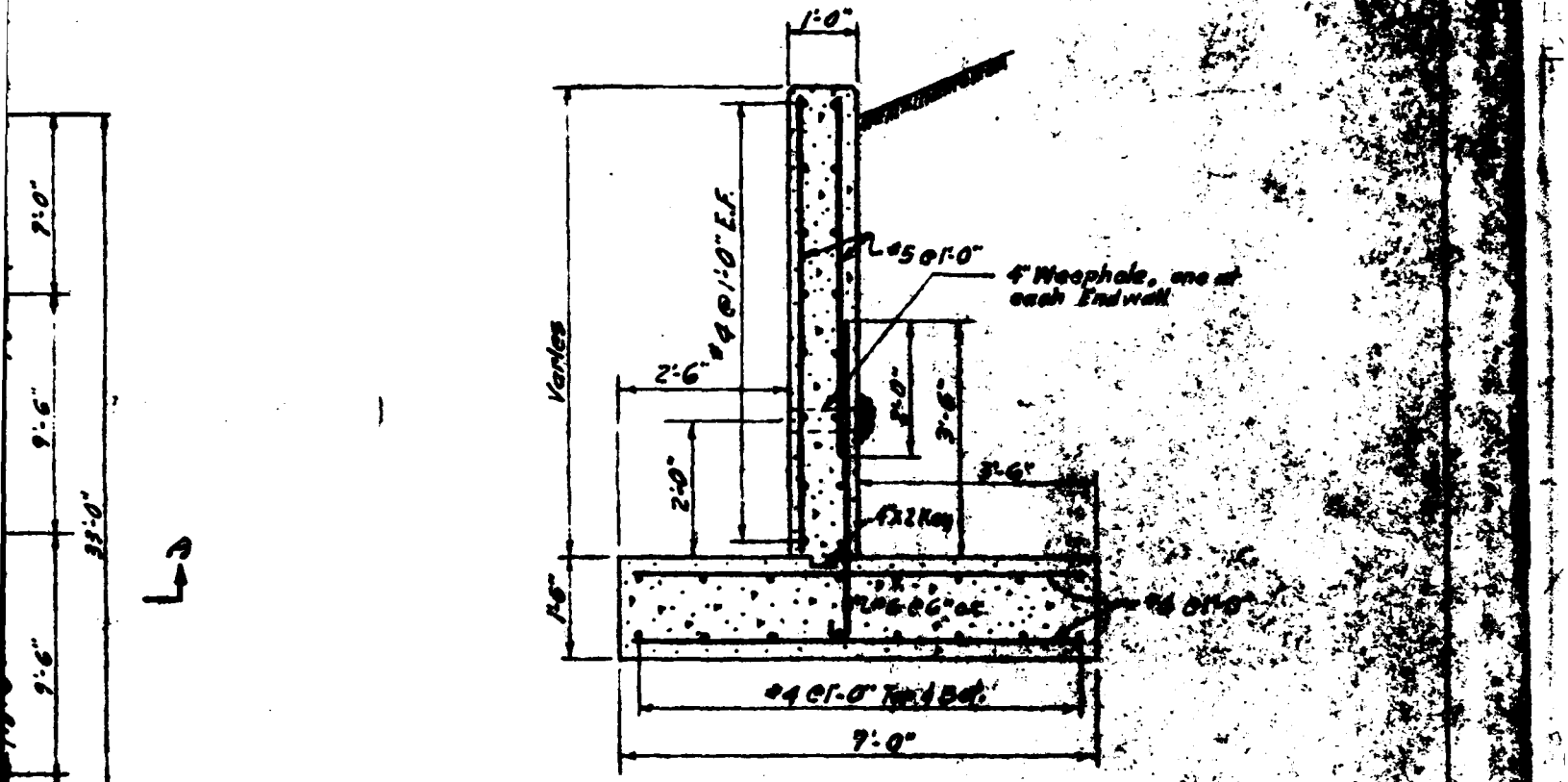


ELEVATION D-D

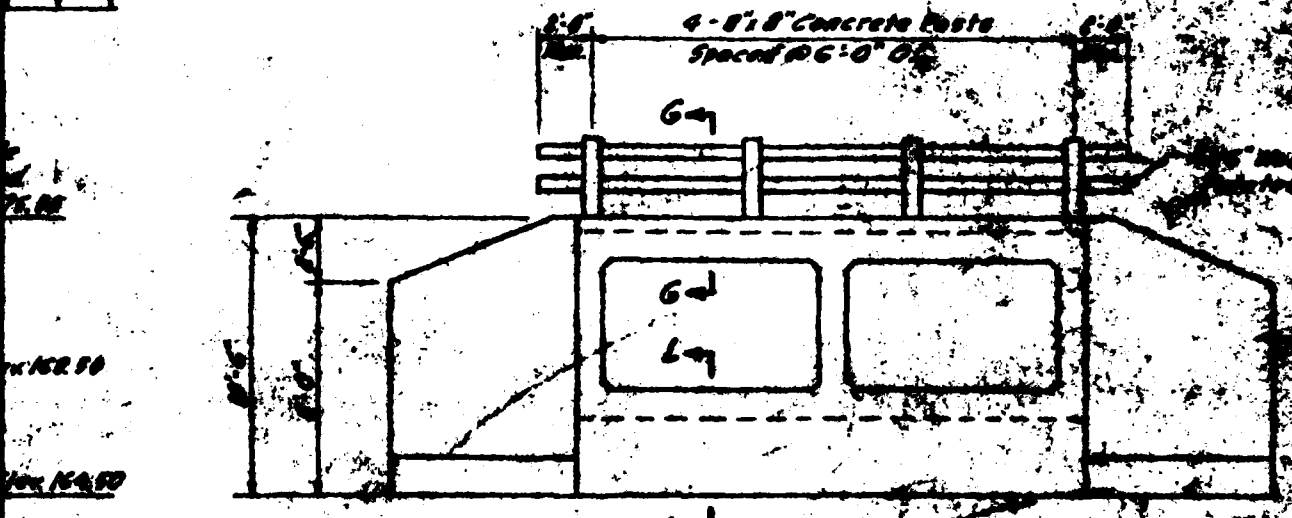
Scale: 1/16"=1'-0"


Symmetrical about ℄ Channel
#5 @1'-0"
@1'-0"
#5 @1'-0"
ON
N
60'-0
1'-0"
6'-0"
2'-6"
3'-6"
C
C
B
Expansion Joint See Detail this Sheet
℄
90°-00'
℄ Channel
A
Sta. 0+72 ℄ = Sta. 1+00 ℄ Culvert
B
#4 #5
#5 @1'-0"
#5
#5
#4
4'-0"
1'-0"
1'-6"
SECTION M-M
Scale: ½"=1'-0"
PL
Scale
D
Proposed Grade 4" Loam Seeded
Elev. 174.70
Exist. Conc Walk
Construct new 6" concrete sidewalks to match existing.
4" Loam Seeded
Replace
Existing Grade
Exist. Curb
Gravel Base
Inv. Elev. 162.50
S=.005
℄ Elev. 163.50
D
SECTIO
Scale:
See Conc. Post


60'-0"
30'-0"
1'-0"
5'-6"
2'-6"
6'-0"
2'-0"
1'-0"
9'-6"
22'-0"
1'-0"
9'-6"
2'-0"
2'-0"
B
B
Construction Joint
See Detail this Sheet
℄ Culvert
℄ Culvert
PLAN
Scale: 3/16" = 1'-0"
onstruct new 4" concrete
dewalks to match existing.
oam Seeded
Replace Existing Grade
Inst. Curb
℄ Armory St.
Construct new 4" concrete
sidewalks to match existing
4" Loam Seeded
Edge Conc.
Walk
Gravel Base
Proposed Grade
4" Loam Seeded
S=.005
Inv. Elev. 168.50
SECTION A-A
Scale: 3/16" = 1'-0"
3/8" Carriage Bolts
See Conc. Post Detail
6" Perforated Filter
Expansion Jt.



SECTION C-C
Scale: ½"=1'-0"



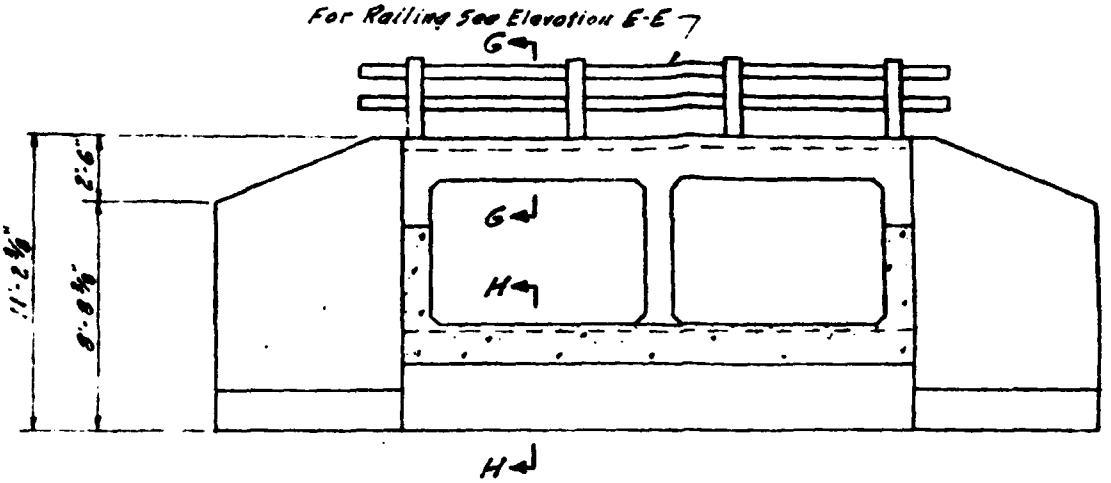
ELEVATION E-E
Scale: ½"=1'-0"

DESIGN DATA:
Live Load: H 20 - S16
Unit Stresses: fc = 18,000 lbs./sq. in.

Scale: ½"=1'-0"

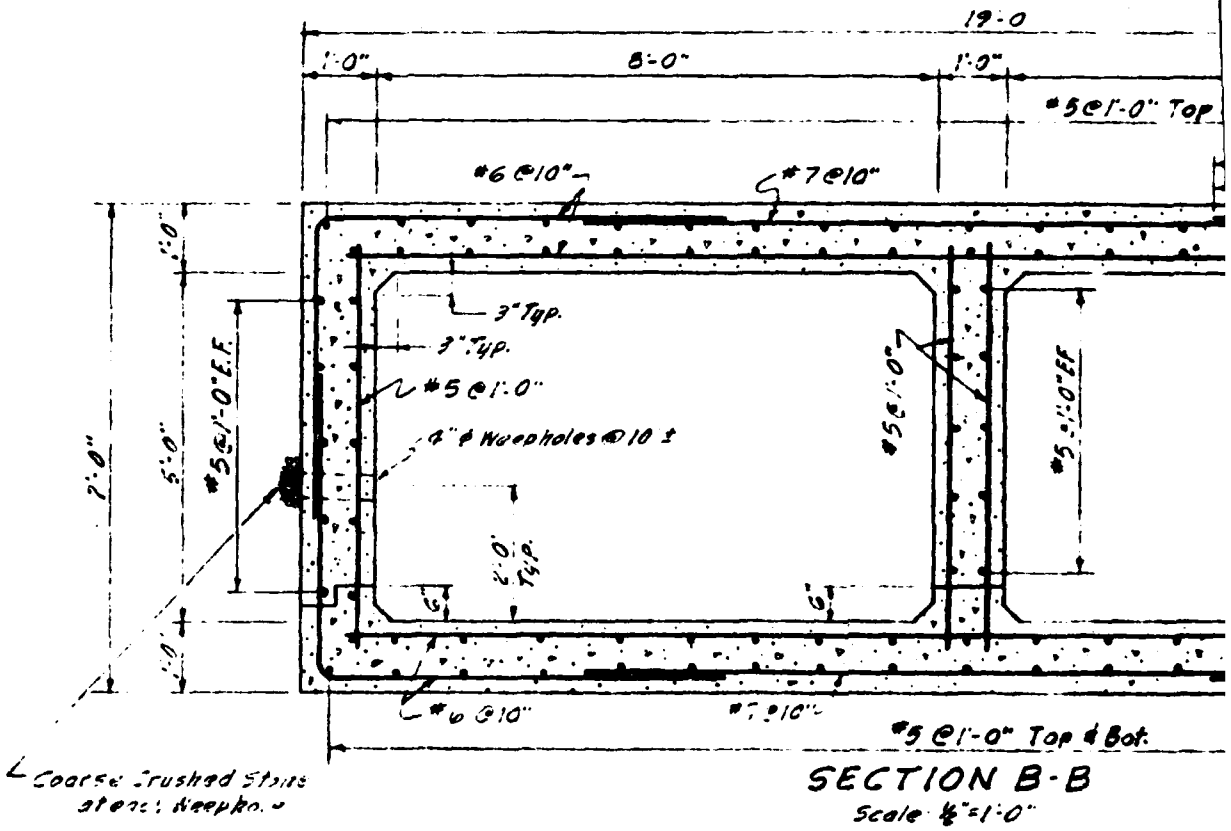
Scale: ½"=1'-0"

For Railing See Elevation E-E



ELEVATION D-D

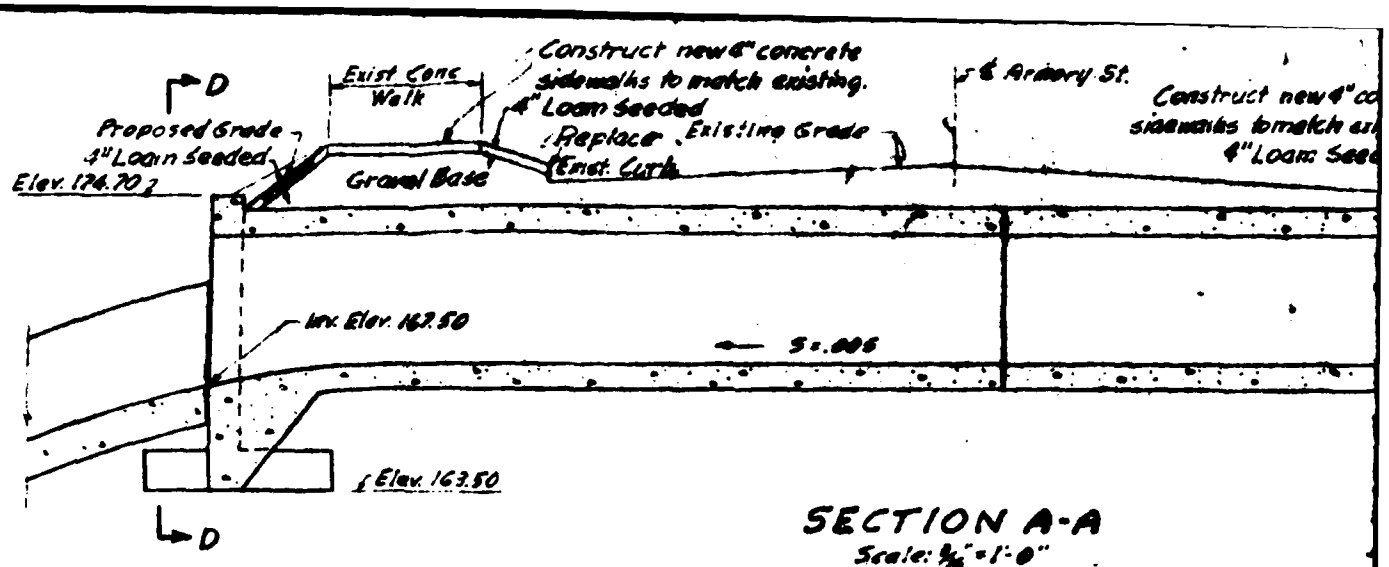
Scale: 3/16"=1'-0"



SECTION B-B

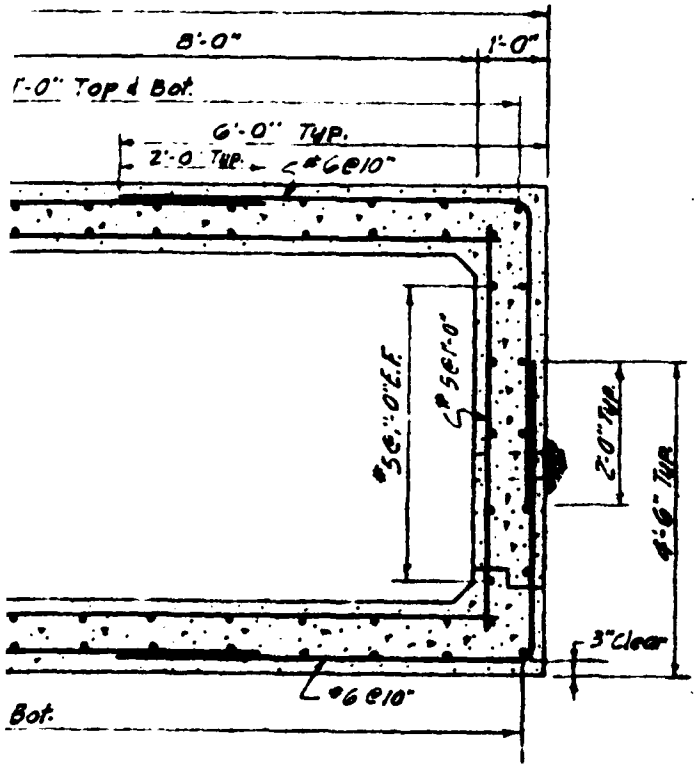
Scale: ½"=1'-0"

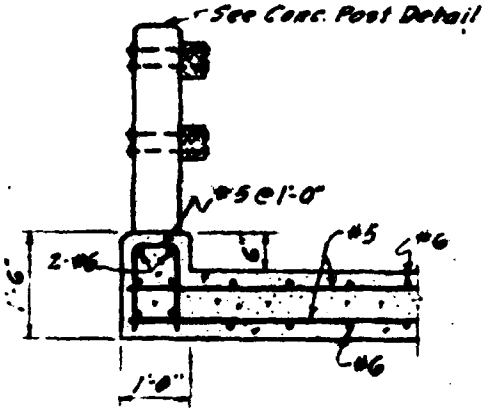
Note: Width for payment of Bituminous Concrete and Gravel Base Course to be Armory ft. of culvert to be specified width of structural excav. plus 3'-0"



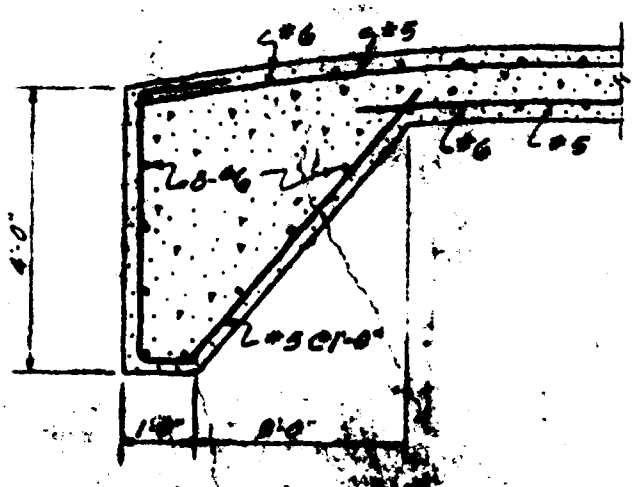
SECTION A-A
Scale: 3/16" = 1'-0"

3/4" Carriage Bolts





SECTION G-G
Scale: 1/2" = 1'-0"

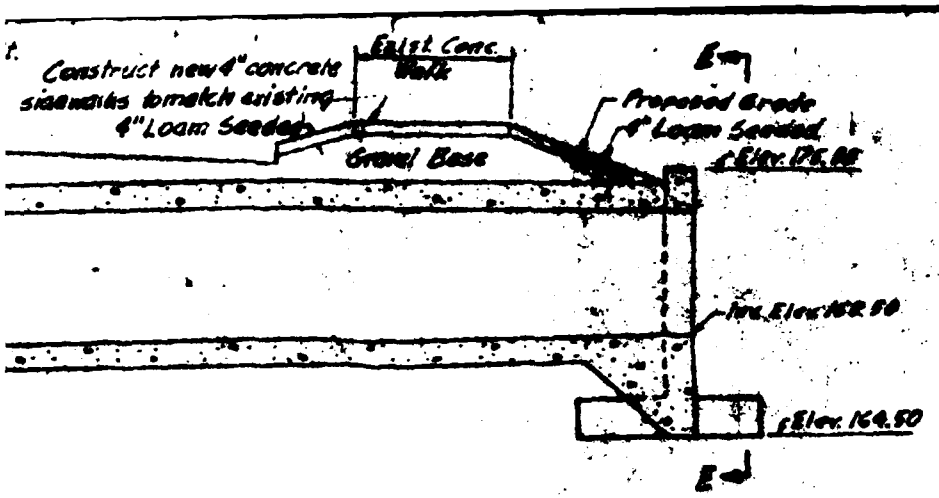


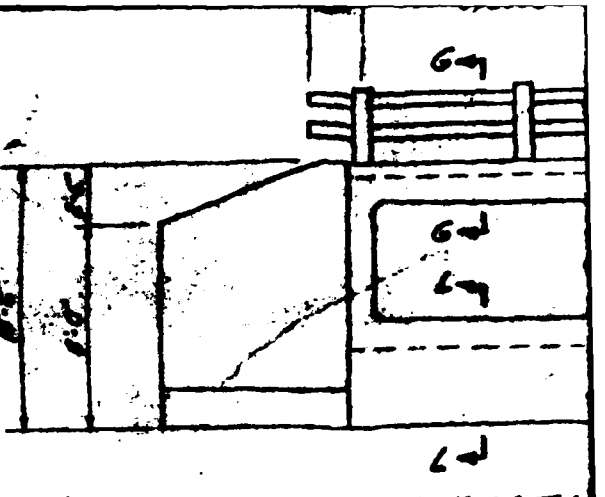
SECTION
Scale:

5'-9 Hoops spaced as shown

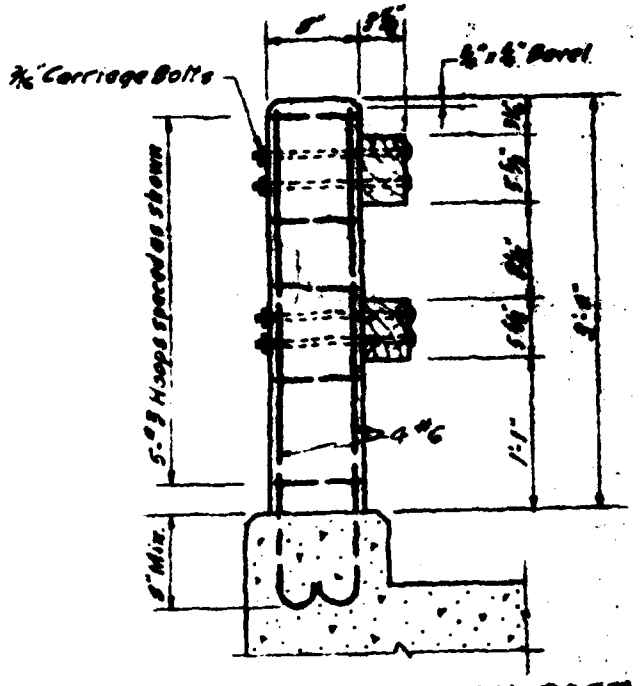
6" Min.

CO

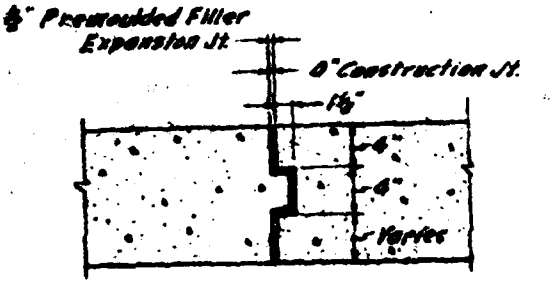




ELEVATI
Scale: 1/



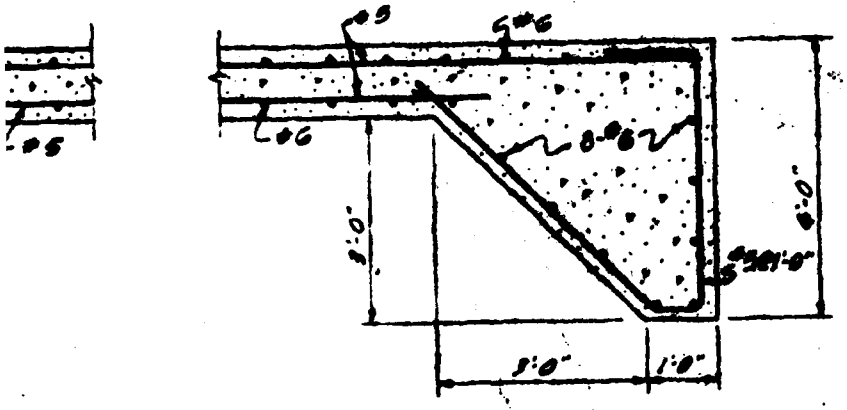
CONC. GUARD RAIL POST
Scale: 1"=1'-0"



CONSTRUCTION & EXPANSION JOINT DETAIL
Scale: 1"=1'-0"

DESIGN DATA
Live Load: H 20
Unit Stresses:

GENERAL NOT
For Location Pl
For location of
A.I exposed edg
otherwis
For Class of Co
All steel shall
face of co
Bars shall be
unless of

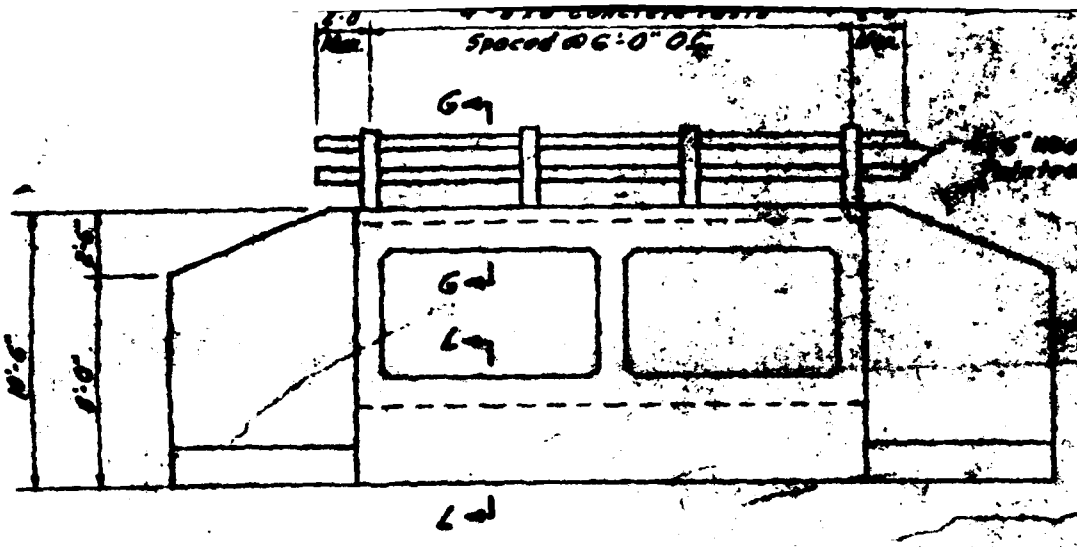


SECTION L-L
Scale: 1/2"=1'-0"

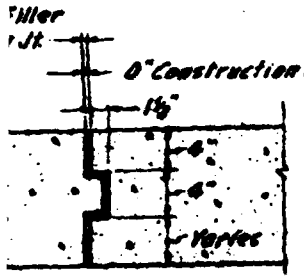
PROPOSE
VA
SPRI
DEPARTMENT OF P
DIVI

UPPER P

GREEN
ENGINE
DESIGNED: J.K.
DRAWN: A.L.T.
CHECKED: H.D.M.



ELEVATION E-E
Scale: 3/8" = 1'-0"



CTION & EXPANSION
OINT DETAIL
Scale: 1" = 1'-0"

DESIGN DATA:

Live Load: H 20 - 44 - per A.A.S.H.O. Specifications

Unit Stresses: fs = 18,000 lbs. / sq. in.
fc = 1,200 lbs. / sq. in.
n = 10

GENERAL NOTES:

For Location Plan & Profile of outlet See Sheet No. 3 of 8
For location of Section M-M See Sheet No. 3 of 8
All exposed edges of concrete to be have a 1"x1" bevel unless otherwise noted.
For Class of Concrete See Specifications.
All steel shall be a minimum of 2" clear from face of concrete unless otherwise noted.
Bars shall be lapped a minimum of 30 bar diameters unless otherwise noted.

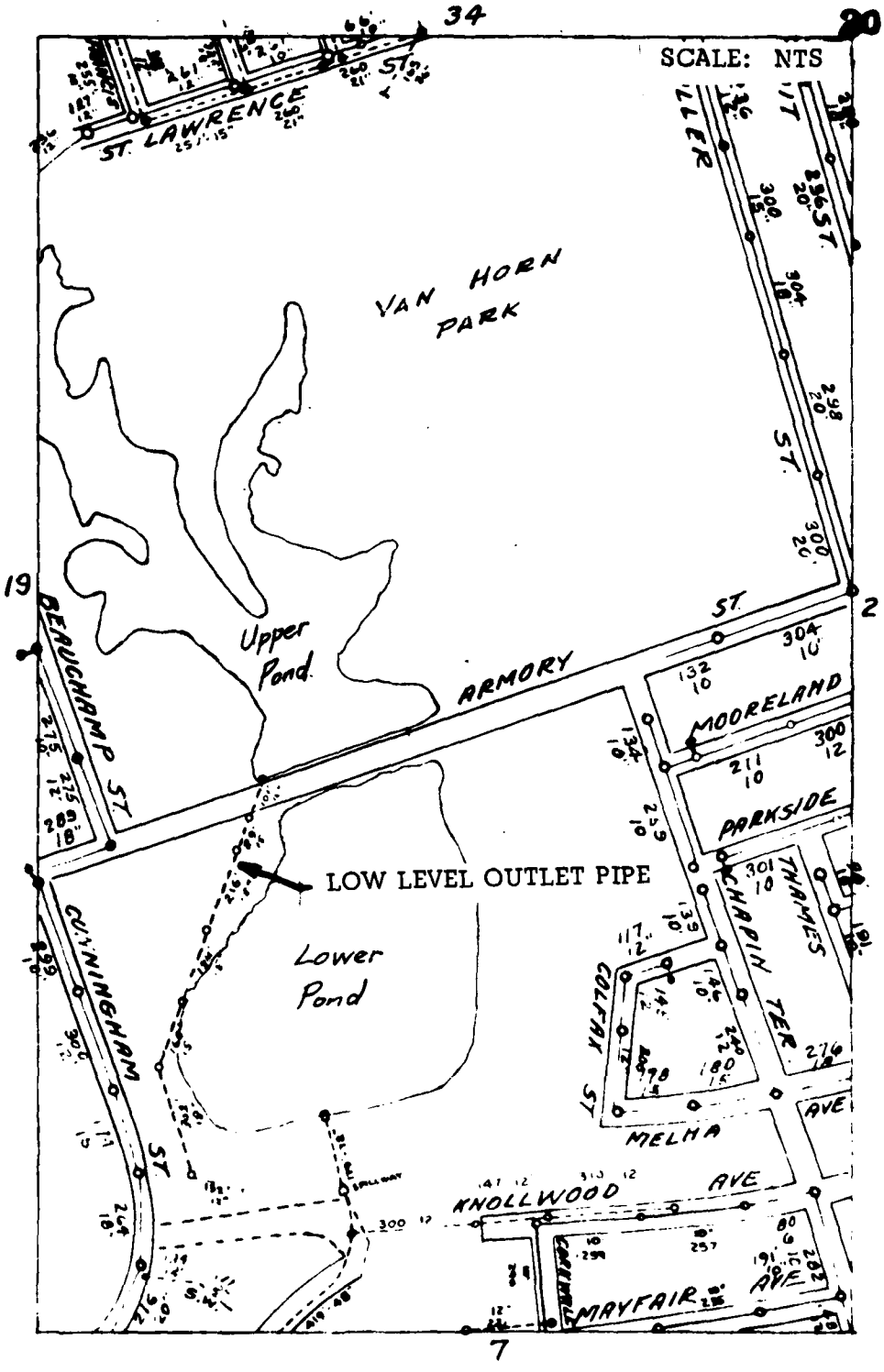
PROPOSED OUTLET WORKS
VAN HORN PARK
SPRINGFIELD, MASS.
DEPARTMENT OF PUBLIC WORKS OF MASSACHUSETTS
DIVISION OF WATERWAYS

UPPER POND OUTLET

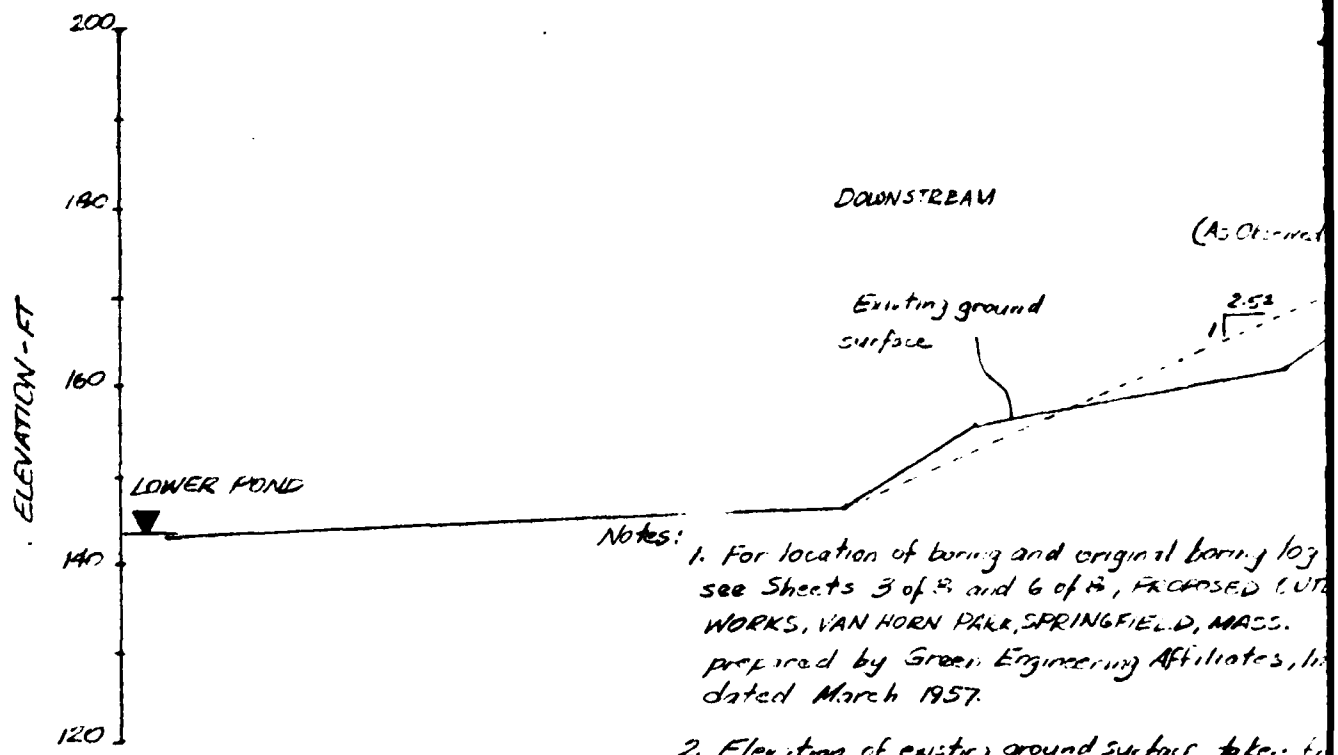
GREEN ENGINEERING ASSOCIATES, INC.
ENGINEERS
BOSTON

DESIGNED: J.K.	SCALE: AS SHOWN
DRAWN: A.L.J.	DATE: MARCH, 1957
CHECKED: H.D.H.	CONTRACT NO. 1763

Sheet No. 8

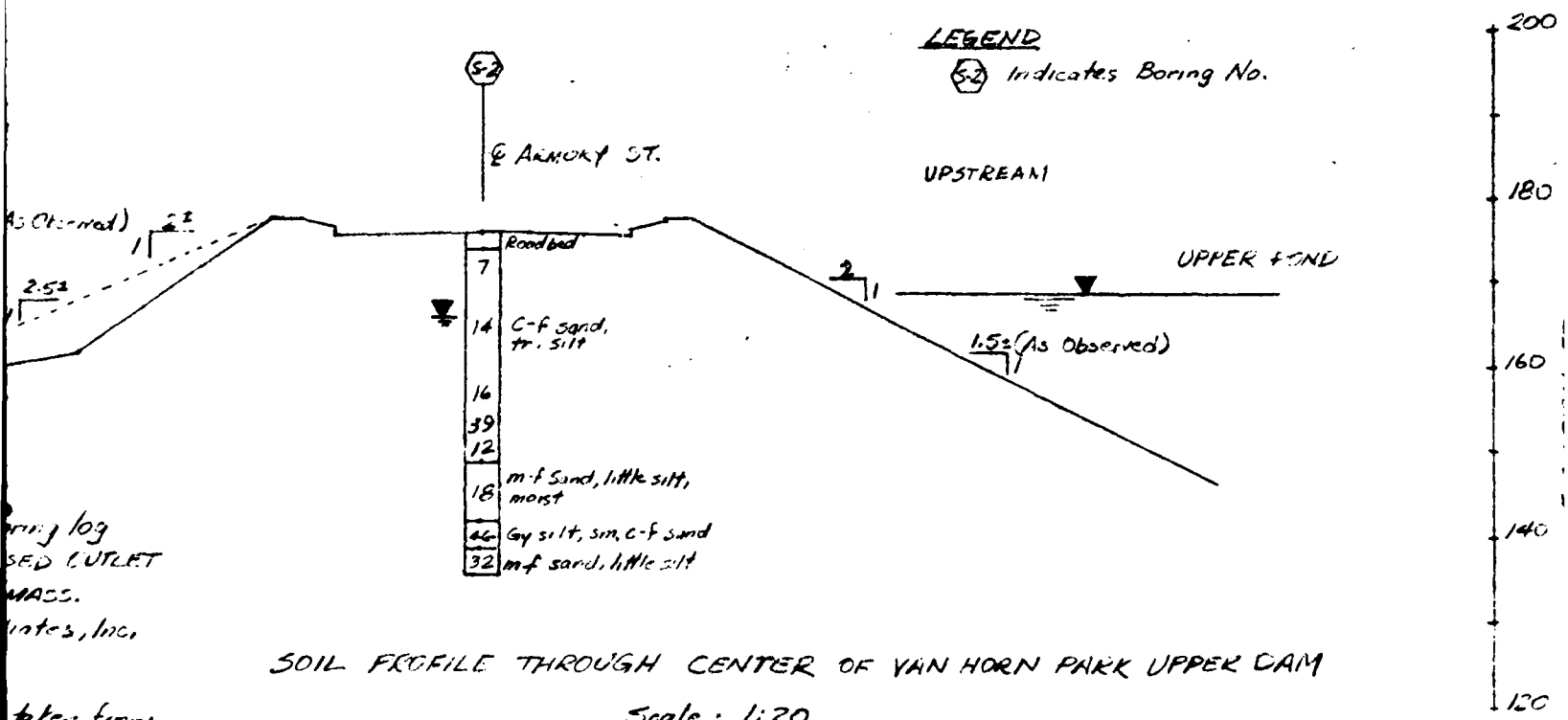


SEWER AND LOW LEVEL OUTLET PLAN
VAN HORN PARK UPPER DAM



Notes:

1. For location of boring and original boring log see Sheets 3 of 8 and 6 of 8, PROPOSED CUT WORKS, VAN HORN PARK, SPRINGFIELD, MASS. prepared by Green Engineering Affiliates, Inc. dated March 1957.
2. Elevation of existing ground surface taken fr drawings noted above.



...ring log
...SED OUTLET
...MASS.
...ates, Inc.

take... from...

SOIL PROFILE THROUGH CENTER OF VAN HORN PARK UPPER DAM

Scale : 1:20

TAMS BROOKLINE MASS.	U.S. ARMY ENGR. DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS VAN HORN PARK UPPER DAM SOILS PROFILE CONNECTICUT RIVER BASIN MASS.	
	SCALE: NTS DATE: JULY 78

The Commonwealth of Massachusetts

EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL QUALITY ENGR.
DIVISION OF WATERWAYS

100 Nashua Street, Boston 02114

February 14, 1977

Park Commission
City of Springfield
Park Department
Forest Park Office
Springfield, Mass.

Re: Insp. Dam #2-7-281-9
Van Horn Park - Upper Dam
Springfield

Gentlemen:
On March 22, 1976 , an Engineer from the Massachusetts Department of Public Works made a visual inspection of the above dam. Our records indicate the owner to be the City of Springfield.
If this information is incorrect, will you please notify this office.

The inspection was made in accordance with the provisions of Chapter 253 of the Massachusetts General Laws as amended (Dams Safety Act). Chapter 706 of the Acts of 1975 transferred the jurisdiction of the so-called "Dams Safety Program" to the Commissioner of the Department of Environmental Quality Engineering.

The results of the inspection indicate that this dam is conditionally safe. The following conditions were noted that require attention:

SEE REVERSE SIDE OF SHEET FOR

"REMARKS AND RECOMMENDATIONS"

We call these conditions to your attention before they become serious and more expensive to correct. With any correspondence please include the number of the dam as indicated above.

Very truly yours,

John J. Hannon, P.E.
Chief Engineer

1978

All: CC: F. J. Hoey, D.H.E. Dist. 2
R. Salls, D.D.E. Dist. 2
Mayor's Office, City Hall, Springfield
Conservation Commission, City Hall, Springfield
✓ File
2-17-77

(OVER)

INSPECTION REPORT - DAMS AND RESERVOIRS

1. LOCATION:

City/~~Town~~ Springfield. County Hampden. Dam No. 2-7-281-9

Name of Dam Van Horn Park - Upper Dam.

Topo Sheet No. 12B. Mass. Rect. Coordinates: N 412,200, E 302,800.

Inspected by: Harold T. Shumway, On 3/22/76. Date Last Inspection 4/22/74

2. OWNER/S: As of March 22, 1976

per: Assessors____, Reg. of Deeds____, Prev. Insp. X, Per. Contact X.

	Name	St. & No.	City/Town	State	Tel. No.
1.	Park Commission City of Springfield, Park Dept.	Forest Park Office	Springfield	Mass.	
2.					
3.					

3. CARETAKER: (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Name	St. & No.	City/Town	State	Tel. No.
Mr. Albert Poehler Dep.Supt. for Maintenance, Park Dept.,	Forest Park Office,	Springfield		

4. DATA:

No. of Pictures Taken None. Sketches See description of Dam.

Plans, Where In Division of Waterways-Boston-Plans for Contract #1743 dated March 1957, ACC 036848A

5. DEGREE OF HAZARD: (if dam should fail completely)*

1. Minor____. 3. Severe____.

2. Moderate____. 4. Disastrous X.

Comments: Approx. 35 Million gallons impoundment. Densely populated area downstream if Lower Dam No. 2-7-281-10 should fail simultaneousl

*This rating may change as land use changes (future development).

6. OUTLETS: OUTLET CONTROLS AND DRAWDOWN

No. 1 Location and Type: Near south end of embankment-two 8'x5' conc. box culverts-invert 7' below top of embankment.

Controls None, TYPE: _____.

Automatic____. Manual____. Operative Yes____, No____.

Comments: Spalled area on the roof of both culverts. A bolted metal clamp over area.

No. 2 Location and Type: Downstream end of conc. box culverts. Conc. chute spillway-17' wide-narrows to 10'-4' high sidewalls drops 22.7'.

Controls None, Type: _____.

Automatic____. Manual____. Operative Yes____, No____.

Comments: Lower 20'± of conc. chute has settled 3" below rest of structure and moved downstream 1" to 2" leaving open seam at construction joints - particularly on floor of chuted.

No. 3 Location and Type: _____.

Controls_____, Type: _____.

Automatic____. Manual____. Operative Yes____, No____.

Comments: _____.

Drawdown present Yes____, No X. Operative Yes____, No____.

Comments: No drawdown shown on plans or located in field.

7. DAM UPSTREAM FACE: Slope 1:1, Depth Water at Dam 15'+.

Material: Turf X. Brush & Trees X. Rock fill___. Conc. Masonry X (Culverts). Wood___.

Other _____.

Condition: 1. Good_____. 3. Major Repairs_____.

2. Minor Repairs X. 4. Urgent Repairs_____.

Comments: Grade of Embankment very irregular-minor brush growth - scattered 6" to 10" trees. Minor spalling of concrete culverts.

8. DAM DOWNSTREAM FACE: Slope 1:1.

Material: Turf X. Brush & Trees___. Rock Fill____. Conc. Masonry X (Spillway Chute). Wood____.

Other _____.

Condition: 1. Good_____. 3. Major Repairs X.

2. Minor Repairs_____. 4. Urgent Repairs_____.

Comments: Brush, trees, seepage, piping, structural movement, washouts, and general erosion of slope. See remarks

9. EMERGENCY SPILLWAY: Available No. Needed No.

Height Above Normal Water _____ Ft.

Width _____ Ft. Height _____ Ft. Material _____.

Condition: 1. Good _____. 3. Major Repairs _____.

2. Minor Repairs _____. 4. Urgent Repairs _____.

Comments: Capacity of outlet structure appears adequate for run-off from small drainage area.

10. WATER LEVEL AT TIME OF INSPECTION: 7½ Ft. Above _____. Below X.

Top Dam X F.L. Principal Spillway _____.

Other _____.

Normal Freeboard 8± Ft.

11. SUMMARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment Yes-minor brush growth-6" to 10" trees upstream slope. minor brush, numerous tree 6" to 20" downstream slope.

Animal Burrows and Washouts Yes, several small gullies on both slopes. Three large washed gullies on downstream slope.

Damage to Slopes or Top of Dam Yes-see above-also evidence of pavement settlement on top of dam.

Cracked or Damaged Masonry Yes-see item #6 sub 1 and sub 2.

Evidence of Seepage Yes-several areas of seepage noted along toe of slope.

Evidence of Piping Yes-approx 30' south of outlet end of culvert chute, near toe of slope-large boil area-1½' deep-fines evident.

Leaks Yes-see above.

Erosion Yes-surface erosion general on both slopes.

Trash and/or Debris Impeding Flow None found.

Clogged or Blocked Spillway None found.

Other A 2'x2' cast iron shell(catch basin type)noted at northerly end of dam at upstream toe of slope. Probing with a stick showed a depth of 18"± to an apparent solid floor. Receptable filled with silt and leaves-a slight water flow into this shell was noted. No evidence of any outlet on downstream slope could be found.

DAM NO. 2-7-281-9

(12) OVERALL CONDITION:

1. Safe_____.
2. Minor repairs needed_____.
3. Conditionally safe - major repairs needed X .
4. Unsafe_____.
5. Reservoir impoundment no longer exists (explain)

   Recommend removal from inspection list_____.

---

(13) REMARKS AND RECOMMENDATIONS: (Fully Explain)

Conditions at this dam have deteriorated further since last inspection of 4/22/74 with no apparent evidence of any repairs or maintenance work on dam since then.

The upstream slope has changed very little since last inspection. The downstream slope has a heavy brush growth, several large trees and general seepage was noted all along toe of slope. Evidence of old washouts was noted along with evidence of a recent washout 65' to 70' south of spillway culverts. This washout has created a large gully which will erode further from surface runoffs. Settlement and movement of lower end of spillway chute has increased slightly since last inspection.

A large boil, 1'± in diameter and 1½' deep by probing, was noted at toe of slope 30'± south of outlet ends of culverts. A large flow of water was evident and considerable fines were noted in area of runoff channel from this boil. It was questioned at last inspection if this were a boil or a spring and apparently no investigation has been done by the City of Springfield to answer this question since then.

It would appear that a more adequate program of maintenance is advisable to repair and maintain a safe and sound structure.

HTS:ma

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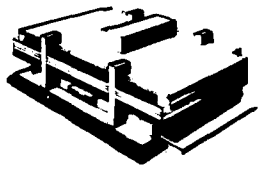
Commonwealth of Massachusetts
County of Hampden
Hall of Justice
50 State Street
Springfield, Massachusetts 01103

OFFICE OF THE
COUNTY COMMISSIONERS

STEPHEN A. MOYNAHAN
CHAIRMAN
ARMANDO G. DIMAURO
RICHARD S. THOMAS



May 25, 1978

Dippedds Abbedd McCarthy Draddon
345 Park Ave.
New York 10022

Attn: H. Feldmen

Sir:

These are the latest reports available in this office. There is also a record of all previous field studies by Tigh & Bond Consulting Engineers and G.H. McDonnell the former County hydraulic engineer. The only plan I have on file is of the Watershop dam as stated in the enclosed report.

Sincerely,

Frank A. Rueli, Jr.
Engineer, Hampden County

These are pertinent excerpts from the original letter.

Commonwealth of Massachusetts

County of Hampden

Springfield, Mass.

Office of the
County Commissioners
52 State Street

William F. Stapleton
Chairman
[redacted]
Lloyd W. Frabet

Stephen A. Moynahan

December 10, 1969

Springfield Parks Commission
Public Parks Department
Forest Park Office
Springfield, Massachusetts

Gentlemen:

In accordance with the provisions of Chapter 253, Section 45, et seq. of the General Laws, Tercentenary Edition, relative to inspections, condition and safety of dams in Hampden County, you are hereby advised that your Middle Dam located in Forest Park and forming the lower of the two larger ponds, as well as your two dams located at Van Horn Park, have been inspected by our Engineer and your attention is called to the following conditions noted and recommendations made by him as related to the dams.

"Van Horn Park Upper Dam

The embankment forming this dam was found to be in good condition. The toe area was noted to be reasonably dry. There was some erosion on the downstream slope in the vicinity of the spillway and at the outlet from a catchbasin near the toe, not too far distant to the right of the spillway structure. The erosion is not dangerous because of the fact the embankment is very wide in relation to its height.

The lower portion of the spillway chute has settled more at the left side of the upstream end. The joint in the floor of the spillway at this location should be sealed so that water will not flow thru the joint, under the floor, and produce further settlement.

The spillway itself is satisfactory other than the settlement as just mentioned. The toe of the spillway is in satisfactory condition and there is no stream bed erosion.

The road extending along the top of the embankment was in good condition. There was no evidence of cracking or settlement. The culvert extending thru the embankment, and which is a part of the spillway facility, was found to be o.k. There were no stoplogs at the culvert entrance. The culvert was relatively free of debris. There was some sand and gravel on the floor but this does not affect the operation of the culvert.

The wingwalls on each side of the culvert entrance have begun to lean a bit toward the lake. This condition is not dangerous and does not affect the safety of the dam.

In the opinion of the undersigned, the dam is safe. However, the owner should take steps to seal the joint in the floor of the spillway chute at the upper end of the lower section where settlement has been taking place during the last few years."

The work recommended by the County Hydraulic Engineer should be accomplished during the coming year. It is essential that the dams be properly maintained and that personnel of your Department do the needed routine maintenance.

Inspections of these dams will be made again during the summer of 1970 by which time it is anticipated you will have completed the work as recommended by the County Hydraulic Engineer.

Any further information concerning this matter which you may desire will be furnished by this office upon request.

Very truly yours,

BOARD OF COUNTY COMMISSIONERS

_____

_____

_____

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Very truly yours,

BOARD OF COUNTY COMMISSIONERS

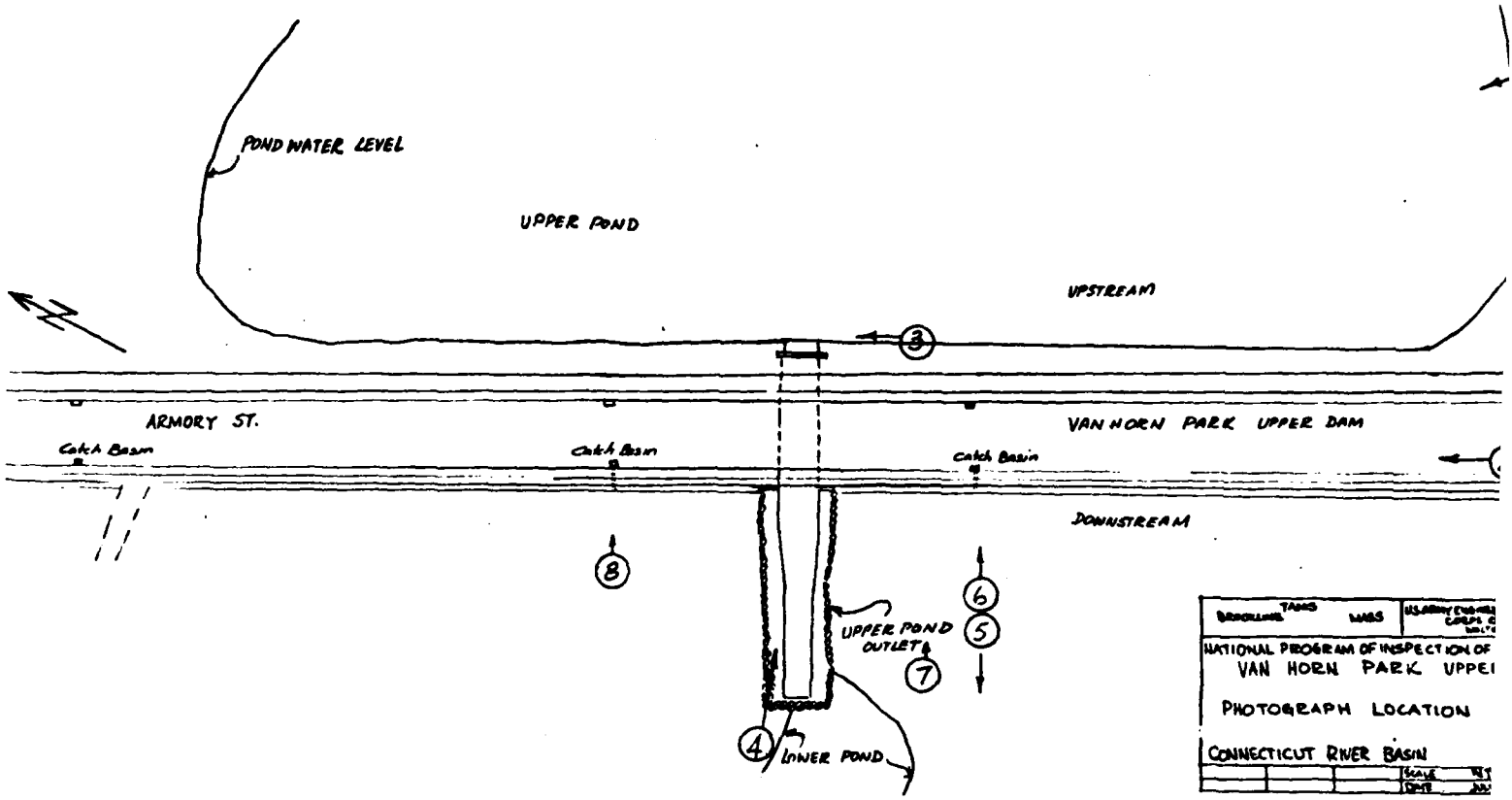
_____

_____

_____

PHOTOGRAPHS

APPENDIX C



NATIONAL PROGRAM OF INSPECTION OF
VAN HORN PARK UPPE

PHOTOGRAPH LOCATION

CONNECTICUT RIVER BASIN

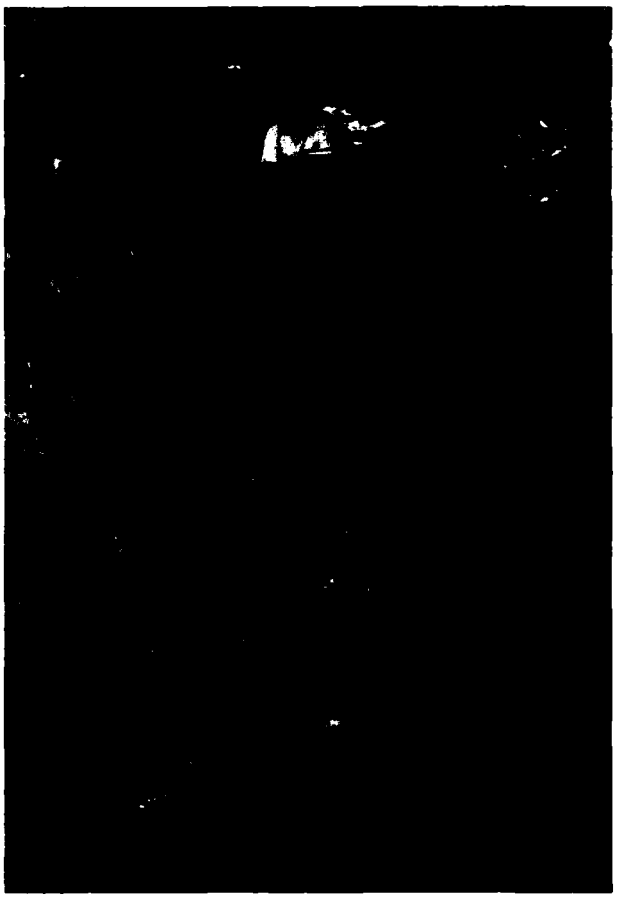
(2) VIEW OF CREST (ARMORY STREET) LOOKING NORTH

(3) VIEW OF UPSTREAM SLOPE LOOKING NORTH, ENTRANCE TO BOX CULVERTS, RIPRAP PROTECTION, DISPLACED HEADWALL AND HEAVY VEGETATION

(4) SPILLWAY CHUTE, SHOWING DISPLACEMENT OF LOWER SECTION, DISPLACEMENT OF RIPRAP, DEBRIS AND HEAVY VEGETATION

(5) SEEPAGE AREA IN GULLY FORMED BY FLOW FROM CATCH BASIN DRAIN LOCATED ON CREST LOOKING DOWNSTREAM

(6) SEEPAGE AREA IN GULLY FORMED BY FLOW FROM CATCH BASIN DRAIN LOCATED ON CREST LOOKING UPSTREAM



(7) SEEPAGE AREA - NOTE LIMONITIC STAINING

(8) POTHOLE ERODED BY FLOW FROM CATCH BASIN LOCATED ON CREST

HYDROLOGIC DATA & COMPUTATIONS

APPENDIX D

VAN HORN PARK UPPER DAM

SCALE 1:24000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 5 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET

DATUM IS MEAN SEA LEVEL

TIPPETTS-ABBETT-McCARTHY-STRATTON
ENGINEERS AND ARCHITECTS NEW YORK

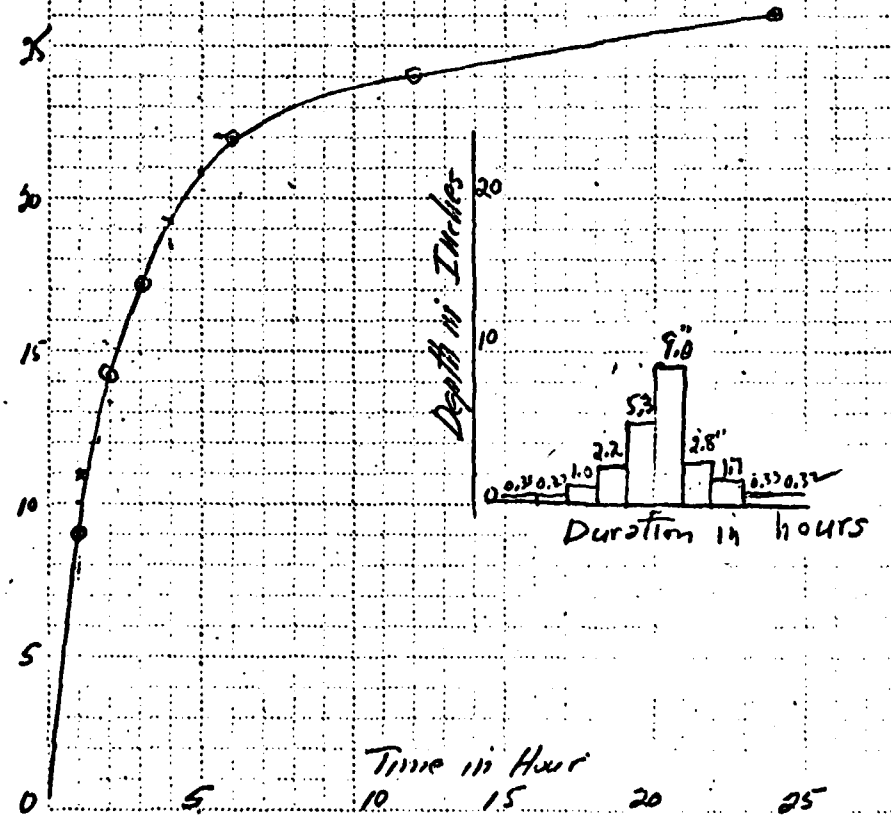
Job No. 1497-09, 10 Sheet 2 of
Project Dam Inspection, Van Horn Park Date 6/9/77
Subject Design Storms, Upper and Lower Dams By GRW
Ch'k. by

Design Storms

100-year Duration (hours)	100-year Depth (inches)
0.5	2.2
1.0	2.75
2.0	3.45
3.0	3.85
6.0	4.5
12.0	5.3
24.0	6.3

PMP (in mi²)	% of 6 hour
9.0	41
14.3	65
17.1	78
22	
24	
26	

6 hr. P.M.P = 22"



TIPPETTS-ABBETT-McCARTHY-STRATTON
ENGINEERS AND ARCHITECTS NEW YORK

Job No. 1497-09, 10 Sheet 3 of
Project Dam Inspection, Van Horn Park Date 6/9/71
Subject Standard Project Storm - Upper Dam By GRW
Ch'k. by

Assume Standard Project Storm = 50% of P.M.P

Time in Hours	Rainfall Excess (in/hr)	Runoff Upper Dam (252 ac) (cfs)
1.0	0.16	42.
2.0	0.50	131
3.0	1.10	288
4.0	2.65	694
5.0	4.50	1179
6.0	1.40	367
7.0	0.85	223
8.0	0.16	42
9.0	0.16	42
	11.48	

TIPPETTS-ABBETT-McCARTHY-STRATTON
ENGINEERS AND ARCHITECTS NEW YORK

Job No. 1497-09 Sheet ___ of ___
Project Dam Inspection, Van Horn Park Date 5/12/71
Subject Stage curve for upper dam By GRV
Chk. by

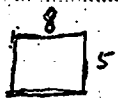
Elev.	Area	Mean Area	Δ vol	STOR Vol (A.F)
168.5	9.6			0
		11.2	16.8	
170.0	12.8			16.8
		13.45	13.4	
171.0	14.1			30.2
		14.75	14.75	
172.0	15.4			44.95
		16.0	16.0	
173.0	16.6			60.95
		17.15	17.15	
174.0	17.7			78.1
		18.3	18.3	
175	18.6			96.4

TIPPETTS-ABBETT-McCARTHY-STRATTON
ENGINEERS AND ARCHITECTS NEW YORK

Job No. 1497-09 Sheet ___ of ___
Project Dam Inspection, Van Horn Park Date 6/27/7
Subject Rating Curve for Outlet of Upper Dam By GRM
Ch'k. by ___

Elev.	Head	Discharge ($Q=CLH^{\frac{3}{2}}$) (cfs.)
168.5	0	0
169	0.5	17.
169.5	1.0	48.0
170	1.5	88.
170.5	2.0	136.0 ✓
171.	2.5	190.
171.5	3.0	249.0
172.	3.5	314.
172.5	4.0	384.0
173.	4.5	458. ✓
173.5	5.0	537.7 (top of culvert)
174.	5.5	619.
174.5	6.0	705
175	6.5	795

$L = 16'$
$C = 3.0$ (neglecting entrance loss)



Area $= 40\ ft^2$
WP $= 26$
$R = 1.53$

Assume culvert will flow full:

$$V = \frac{1.486}{n} R^{\frac{2}{3}} S^{\frac{1}{2}}$$

$$= \frac{1.486}{n} (1.53)^{\frac{2}{3}} (0.005)^{\frac{1}{2}}$$

$$= 10.6$$

$$Q = AV = (2)(40)(10.6)$$

$$= 848$$ (too much — will not flow full except under head.

Routing 1 Sheet 1

DAM INSPECTION, VAN HORN PARK
STANDARD PROJECT STORM-UPPER DAM

INPUT PARAMETERS

STARTING ELEV (FT.)	TIME INTERVAL (HOURS)	STARTING TIME (HOURS)	ENDING TIME (HOURS)	PRINT INTERVAL	GATE OPTION	PLOT OPTION	STORAGE COEF.	OUTFLOW COEF.	INFLOW COEF.	TIME COEF.	BREAK TIME
168.50	0.25	1.00	9.00	1	NO	NO	1.000	1.000	1.000	1.000	0.000

RESERVOIR ELEV. (FT.)	RESERVOIR STORAGE (ACFT)	RESERVOIR OUTFLOW (CFS)
168.50	0.0000	0.00
170.00	16.8000	88.00
171.00	30.2000	190.00
172.00	44.9500	314.00
173.00	60.9500	458.00
174.00	78.1000	619.00

Routing 1 Sheet 2

	TIME (HRS)	INFLOW (CFS)	OUTFLOW (CFS)	STORAGE (ACFT)	ELEVATION (FT.)
	1.00	42.00		0.0000	168.50
	1.25	64.25	5.44	1.0403	168.59
	1.50	86.50	12.62	2.4096	168.71
	1.75	108.75	21.34	4.0741	168.86
	2.00	131.00	31.44	6.0037	169.03
	2.25	170.25	43.67	8.3374	169.24
	2.50	209.50	58.66	11.2004	169.50
	2.75	248.75	76.15	14.5384	169.79
	3.00	288.00	99.34	18.2902	170.11
	3.25	389.50	134.18 ✓	22.8672	170.45
	3.50	491.00	178.72	28.7187	170.88
	3.75	592.50	235.58	35.6228	171.36
	4.00	694.00	300.58	43.3546	171.89
	4.25	815.25	376.82	51.9300	172.43
	4.50	936.50	461.64 ✓	61.3385	173.02
	4.75	1057.75	556.05	71.3951	173.60
	5.00	1179.00	655.19	81.9558	174.22
	5.25	976.00	729.65	89.8869	174.68
Failure →	5.50	773.00	755.19	92.6073	174.84
	5.75	570.00	740.43	91.0355	174.75
	6.00	367.00	692.49	85.9283	174.45
	6.25	331.00	631.93 ✓	79.4773	174.08
	6.50	295.00	575.70	73.4876	173.73
	6.75	259.00	523.03	67.8778	173.40
	7.00	223.00	473.31	62.5810	173.09
	7.25	177.75	426.45	57.4452	172.78
	7.50	132.50	380.41	52.3296	172.46
	7.75	87.25	334.51	47.2289	172.14
	8.00	42.00	290.30	42.1319	171.80
	8.25	42.00	250.71	37.4224	171.48
	8.50	42.00	217.43	33.4638	171.22
	8.75	42.00	189.51	30.1362	170.99
	9.00	42.00	168.04	27.3160	170.78
MAX. VALUES		1179.00	755.19		174.84
MIN. VALVES		42.00	0.00		168.50

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

STATE	IDENTITY NUMBER	DIVISION	STATE	COUNTY	CONGR DIST.	STATE	COUNTY	CONGR DIST.	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY | MO | YR
MA	574	NED	MA	013	02				VAN HORN PARK UPPER DAM	4207.6	7235.7	28JUL78

POPULAR NAME	NAME OF IMPOUNDMENT
	VAN HORN PARK UPPER POND

REGION	BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY-TOWN-VILLAGE	DIST FROM DAM (MI.)	POPULATION
01	08	TR-CONNECTICUT RIVER	SPRINGFIELD	0	164000

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT.)	HYDRAULIC HEIGHT (FT.)	IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT.)	IMPOUNDING CAPACITIES NORMAL (ACRE-FT.)	DIST	OWN	FED R	PRV/FED	SCS A	VER/DA
REPG	1957	R	34	32	333	134	NED	N	N	N	N	28JUL

REMARKS

D/S HAS	SPILLWAY CREST LENGTH	SPILLWAY TYPE	SPILLWAY WIDTH (FT.)	MAXIMUM DISCHARGE (FT.)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NAVIGATION LOCKS NO.	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)
1	550	U	16	730	73700											

OWNER	ENGINEERING BY	CONSTRUCTION BY
CITY OF SPRINGFIELD		

REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NONE	NONE	NONE	NONE

INSPECTION BY	INSPECTION DATE DAY | MO | YR	AUTHORITY FOR INSPECTION
TIPPETTS-ABBETT-MCCARTHY-STRATTON	01JUL78	PL 92-367

REMARKS

END

DATE
FILMED

8 -85

DTIC